MILKEN INSTITUTE

NOVEMBER 2025

A Pivotal Role:

LIQUID BIOPSIES

IN THE FUTURE OF CANCER CARE

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LIQUID BIOPSIES: USHERING IN A NEW ERA

Despite billions of dollars in public and private investment over more than 50 years and significant scientific breakthroughs, cancer remains one of the leading causes of death in the United States.[1] Although the risk of dying from cancer has steadily declined in the past 30 years, new cases are expected to exceed 2 million in 2025, the second consecutive year the US will reach that number.[2] Globally, over 35 million new cancer cases are predicted in 2050, a 75 percent increase from an estimated 20 million in 2022.[3] As cancer incidence rates increase and more people are expected to live longer due to improvements in treatment, diagnostic tests that identify cancer, monitor its progression, and inform treatment will play an increasing and pivotal role in the fight to conquer cancer.

Cancer care is entering a new era. A convergence of scientific innovation and patient-centered care is redefining how we detect, monitor, and treat the disease, moving us away from traditional invasive, inaccessible, or otherwise inconvenient methods and toward versatile, noninvasive approaches, such as liquid biopsies. A liquid biopsy is a laboratory test that uses bodily fluids, like a blood or urine sample, to look for molecular markers released by a tumor, such as DNA or RNA. Particularly, laboratory tests called blood-based assays, which analyze and measure circulating tumor DNA (ctDNA) in blood samples, are being used to detect multiple types of cancer, monitor minimal/measurable residual disease (MRD), select therapies, and measure treatment efficacy. Blood-based liquid biopsies are not a new technology, but they are still evolving, and the evidence supporting their range of applications continues to grow.

This report is the first in a two-part series exploring how innovation in liquid biopsies are poised to shape the future of cancer care over the next five years. The series focuses on blood-based tests, their rapid innovation, and their immediate clinical promise—they are already being used in some clinical settings. In this report, FasterCures examines how advances in cancer diagnostics, especially liquid biopsies, are impacting the current state of cancer care and hold promise for the future. The second report will include a deeper dive into the challenges of adopting liquid biopsies and outline the changes required to address these challenges and equip the US health system to implement liquid biopsies at scale.

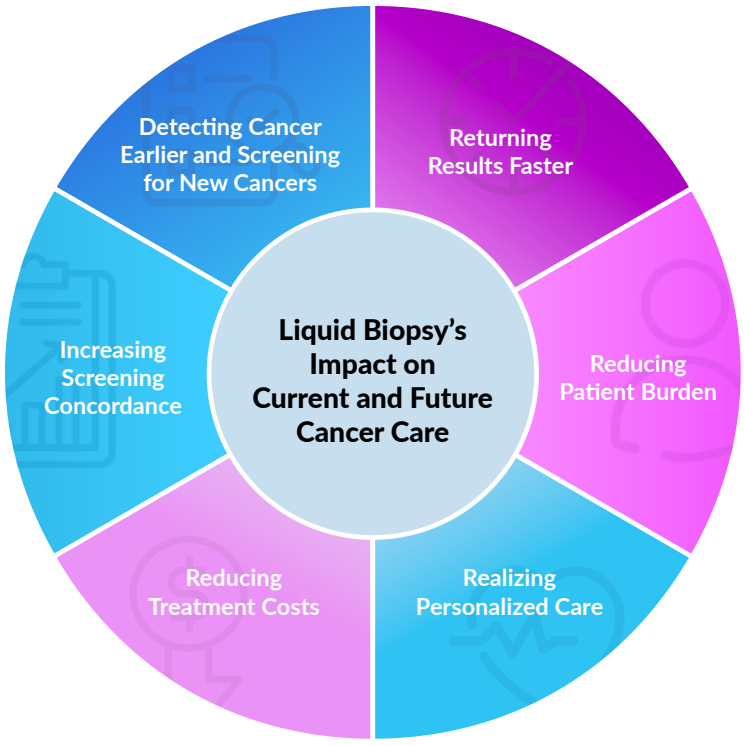
This series builds on FasterCures' ongoing work to define and measure the ideal performance of the biomedical ecosystem to address patient needs and advance better outcomes. This focus on oncology allows for a deeper analysis of a mature segment of that ecosystem, aiming to spur larger-scale action to address persistent challenges in diagnostics.

KEY TAKEAWAYS

Innovative diagnostics like blood-based assays are already transforming how we detect, treat, and monitor cancer. Liquid biopsies will impact the future of cancer care by achieving the following (shown in Figure 1):

- **Returning results faster:** Unlike tissue biopsies, which often involve surgical procedures and specialized clinical staff, equipment, and facilities, blood-based liquid biopsies can be collected by a phlebotomist, cutting down scheduling time frames.
- **Reducing patient burden:** In many cases, blood-based tests allow patients to avoid repeated scans or biopsies, which can be physically taxing and logistically complex, especially for those who are undergoing ongoing cancer treatment.
- **Realizing personalized care:** Using liquid biopsies for treatment selection and disease monitoring facilitates timely and appropriate treatment, could reduce the likelihood of patients receiving unnecessary treatment, and could reduce hospital visits, making care more patient-centric.
- **Reducing treatment costs:** Liquid biopsies may reduce costs associated with treating later-stage or metastatic disease, including hospital readmissions, complications, and ineffective treatments, given their ability to detect cancers in earlier stages and enable providers to identify personalized therapies.
- **Increasing screening concordance:** Liquid biopsies offer a noninvasive alternative to people who might otherwise remain unscreened by current methods.
- **Detecting cancer earlier and screening for new cancers:** Some liquid biopsies can detect cancer in earlier stages and screen for cancers that do not currently have screening methods.

Figure 1 | Liquid Biopsies' Impact on the Future of Cancer Care



Source: Milken Institute (2025)

OBJECTIVES AND METHODS

This research aims to explore the expected advances in cancer diagnostics, focusing on blood-based technologies. It will also examine how these advances are predicted to shape cancer care in the next five years.

Our research approach included secondary research on innovative cancer diagnostics, particularly blood-based liquid biopsies. We reviewed gray and peer-reviewed literature focusing on implementation of diagnostics throughout the cancer journey, including screening and early detection, treatment, and monitoring. This desktop research was supplemented with stakeholder interviews to help develop a deeper understanding of the innovation happening in cancer diagnostics and the potential impact of this innovation on the future of cancer care. A virtual roundtable with experts across the cancer care continuum was hosted to help test our research findings and better understand the anticipated areas where the widespread adoption of liquid biopsies would most impact cancer care.

Some applications of liquid biopsies are considered standard of care, as seen in therapy selection for advanced cancers. Multiple products with this application are included in clinical guidelines and broadly reimbursed by Medicare and private payers. The technology that underlies liquid biopsies for therapy selection and genomic profiling is now expanding across the cancer care continuum through monitoring, MRD, and screening. However, we acknowledge that many liquid biopsies are still in development, with these products' efficacy and utility continuing to evolve.

This report focuses not on the outcomes of this evidence-generation process but on the health system–level factors linked to the broader adoption of liquid biopsies, which is anticipated over the next five years. Our research does not weigh in on the scientific accuracy or validity of these tests. Rather, it focuses on their potential to improve guideline-concordant or standard practice of care and their projected impact on the future of cancer care. The widespread adoption and patient benefit of these tests will rely heavily on their demonstrated clinical utility, including sensitivity and specificity.

THE EVOLUTION OF CANCER DIAGNOSTICS

Broadly, diagnostic tests help determine a person's disease or condition based on their signs and symptoms. They can also be vital in planning treatment, monitoring how well treatment works, and informing the prognosis.[4] We see this especially in cancer; thanks to incredible advancements in detecting and treating disease, cancer survival overall has increased from 49 percent in the mid-1970s to 69 percent for diagnoses made between 2014 and 2020.[5]

Accurate and timely cancer diagnostics enable early detection and support treatment planning, serving as the foundation of personalized medicine.[6] The ability to detect cancer earlier and monitor its evolution throughout treatment is closely tied to improved patient survival, quality of life, and outcomes.[7] The better and faster we can diagnose cancer and its recurrence or identify actionable mutations in an advanced patient, the greater the likelihood of successful intervention and long-term survivorship.

LIMITATIONS OF THE CURRENT GOLD STANDARD

Historically, the oncology field has relied on imaging technologies like MRI, PET scans, and CT scans, as well as tissue biopsy, to identify the presence, type, and progression of cancer.[8] However, many barriers prevent patients from obtaining these diagnostic services, including the high cost and limited access to specialized facilities outside academic medical centers. Additionally, these approaches are often associated with considerable delays in obtaining actionable results.

The current gold standard, tissue biopsy, involves the surgical removal of a tumor sample, which is invasive and can cause pain and harm to the patient.[9] Tissue biopsies typically require scheduling a surgical or image-guided procedure, which can involve coordination across multiple specialties or facilities, resulting in wait times ranging from several days to weeks before results are available.[10] High-quality tissue biopsies can also be challenging for some patients to access or may not be feasible, given their frailty during treatment.[11] In addition to being difficult to collect, a tissue biopsy is not convenient for continuously monitoring disease progression.[12]

COMMON IMAGING TECHNOLOGIES IN ONCOLOGY

Magnetic resonance imaging (MRI) uses magnetic fields and radio waves to create images of the structures inside the body. Positron emission tomography (PET) scan uses a radioactive substance called a tracer injected into the bloodstream to visualize and assess how organs and tissues are functioning at a cellular level. Computed tomography (CT) scan uses a combination of X-rays and computer technology to create images of the structures inside the body.

Imaging can be a powerful diagnostic tool; however, like tissue biopsy, imaging techniques have limitations. For example, MRI and ultrasound have limited sensitivity in detecting small or early-stage cancerous lesions.[13] MRIs are also time-consuming and require patients to remain in an enclosed machine, which can be problematic for those who are claustrophobic. In addition, imaging techniques like PET and CT have an increased risk of radiation exposure that might be suboptimal for certain patients.[14]

PAVING THE WAY FOR LIQUID BIOPSIES

Limitations of traditional diagnostics have helped pave the way for the evolution of liquid biopsies.[15] Liquid biopsies enable the detection of cancer-related biomarkers from bodily fluids such as blood, urine, semen, saliva, pleural fluid, breast milk, and cerebrospinal fluid, with blood-based assays alone detecting over 50 different cancer types.[16] Blood-based tests have emerged as the most widely studied and clinically adopted, driving much of the rapid innovation in cancer diagnostics in the past 10 years.[17]

Blood-based liquid biopsies demonstrate promising versatility and have been implemented across the cancer care continuum in academic and community care settings.[18] There is a growing evidence base for the use of liquid biopsies for MRD, including broad Medicare coverage, and applications in treatment selection are considered standard of care in many use cases, with National Comprehensive Cancer Network guidelines supporting their use in 19 tumor types. A handful of these blood-based assays have already received regulatory approval and insurance coverage in treatment selection across solid-tumor cancers, with more approvals likely to follow in other indications as the evidence base grows, supporting the growing role of liquid biopsies in real-world clinical practice. Although the use of liquid biopsies in screening is still emerging, a test for colorectal cancer (CRC) screening recently received Food and Drug Administration (FDA) approval and Medicare coverage—a promising sign for future use of liquid biopsies in early detection of cancer.

Blood-based assays can mitigate complications associated with invasive tissue biopsy, including bleeding, infections, and pain.[19] Liquid biopsies use readily available bodily fluids, allowing for repeated sampling over time, or serial testing, which can facilitate monitoring and real-time treatment adjustment.[20] Unlike other diagnostic tests, blood-based assays can also be deployed across the cancer care continuum, from screening to monitoring treatment response, assessing drug resistance, and predicting recurrence.[21] As a result of this versatility, we see the fast-paced development of products, with tests receiving FDA approval and insurance coverage for treatment selection, and the first for screening in recent years.[22]

APPLICATIONS OF LIQUID BIOPSIES

LIQUID BIOPSIES' APPLICATIONS IN TREATMENT AND MONITORING

Some of the most well-established applications of liquid biopsies are in the treatment and monitoring of cancer. One such use case is treatment selection through comprehensive genomic profiling (CGP). CGP uses next-generation sequencing (NGS) to help guide cancer therapy selection and predict patient outcomes by analyzing a tumor's complete genomic profile and identifying actionable biomarkers. In the mid-2000s, the rise of NGS allowed for the rapid and simultaneous analysis of hundreds of genes, pushing implementation and adoption of CGP, first in advanced and metastatic non-small cell lung cancer and later in other solid tumor types, as seen today.[23] Further, the use of liquid-only companion diagnostic tests (CDx) can help identify which patients will most likely benefit from a particular treatment and identify patients who might be at increased risk for serious side effects.

In some cases, liquid biopsy is the only viable testing option. For example, Guardant360 CDx is the sole companion diagnostic for elacestrant, Menarini's oral selective estrogen receptor degrader for ESR1 mutated metastatic breast cancer.[24] Multiple liquid biopsies in therapy selection are approved by the FDA and embedded in guidelines, with some obtaining Medicare and private payer coverage. However, private payer coverage can be more restrictive based on tumor type; it is typically covered when used as a CDx.[25]

Liquid biopsies can also monitor patients' response to therapy over time and detect MRD. Throughout a patient's treatment journey, MRD testing can diagnose cancer progression, recurrence, or relapse before there is clinical, biological, or radiographic evidence.[26]

By identifying traces of ctDNA, MRD testing can detect cancer before imaging or when patients have symptoms of lingering disease. In the early-stage setting, MRD can be used after patients have had surgery to determine whether they need adjuvant (post-surgery) therapy to reduce the risk of relapse. In a surveillance setting, MRD testing can detect recurrence in patients with no remaining signs of cancer. MRD testing was first established in hematologic malignancies or blood cancers, but it is increasingly being applied to solid tumors.

In an advanced cancer setting, these tests can also monitor the patient's response to treatment over time (based on increasing or decreasing levels of ctDNA in the blood), allowing the oncologist to assess whether the current treatment is effective. In addition, monitoring ctDNA levels can help oncologists make informed decisions about whether to intensify treatment, switch therapies, or discontinue treatment based on how an individual's cancer responds to a given therapy.

There are also many applications of liquid biopsy for monitoring using ctDNA-based genomic profiling tests, including tests that reveal specific genomic and epigenomic changes in the patient's tumor. These liquid biopsies can assess the potential emergence of specific mutations and whether previously prescribed therapy should be switched. For example, the recently published SERENA-6 trial demonstrated that ctDNA-based detection of the emergence of ESR1 mutations in metastatic breast cancer patients enabled therapy switching before radiographic progression, improving progression-free survival.[27]

These advances illustrate how liquid biopsies are not just complementary to tissue testing but, in some settings, are indispensable for personalized and precise oncology care.

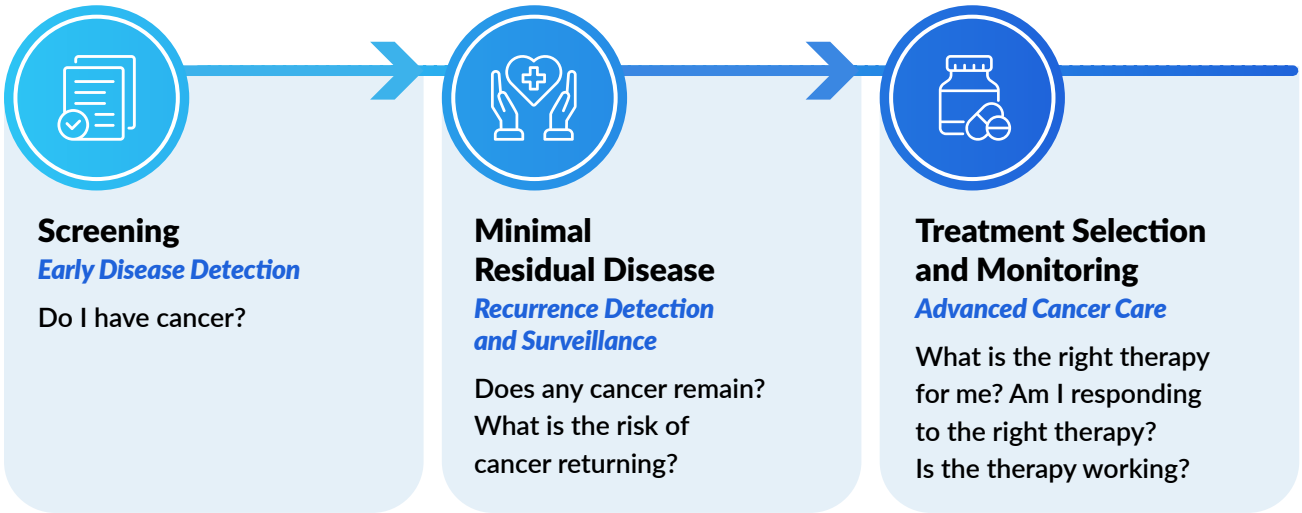
LIQUID BIOPSIES' APPLICATIONS IN SCREENING

Liquid biopsies provide a noninvasive alternative for individuals who are hesitant, unwilling, or unable to undergo standard screening procedures. These tests detect cancer-associated biomarkers—such as circulating tumor cells, ctDNA, circulating (or cell-free) microRNAs, and extracellular vesicles shed by a tumor—that are present in the bloodstream. Follow-up with confirmatory imaging or tissue biopsy is required if a signal is detected, noting the presence of cancer.

Several liquid biopsies are available to screen for cancer in asymptomatic or at-risk individuals.[28] Current assays include single-cancer and multi-cancer detection (MCD) tests, which simultaneously identify several cancers. Single-cancer tests are beginning to make headway, including the test for CRC that received FDA approval, Medicare coverage, and inclusion in clinical guidelines. While MCD tests hold considerable promise, they remain largely under development and are not yet widely accessible.

Figure 2 shows the different applications of liquid biopsies across the cancer care continuum and questions a patient may have that can be answered through those applications.

Figure 2 | Liquid Biopsy Uses Across the Continuum of Cancer Care

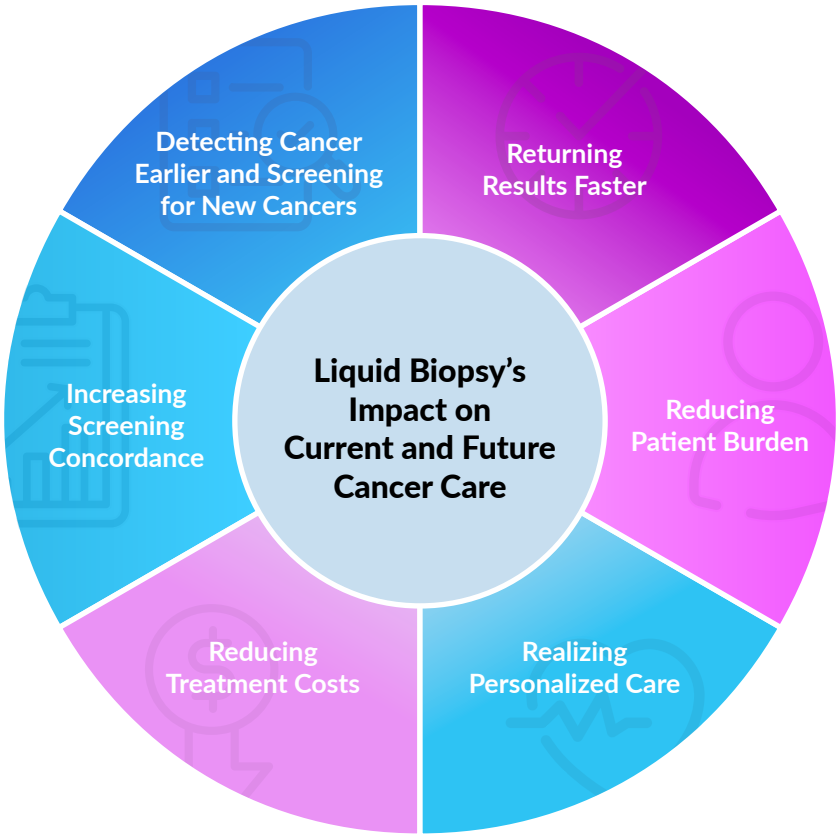


Source: Milken Institute (2025), adapted from Guardant Health (2024)

LIQUID BIOPSIES' IMPACT ON THE FUTURE OF CANCER CARE

Liquid biopsies are poised to significantly reshape the way cancer is diagnosed, treated, and monitored. Across several clinical settings, liquid biopsies are already making a measurable impact: enabling earlier interventions, informing personalized therapy decisions, and reducing the physical and logistical burden associated with conventional diagnostic procedures, with the scale of impact varying by use case and maturity. Based on our analysis of current literature and stakeholder perspectives, we identified several areas where liquid biopsies are already accelerating meaningful progress in cancer care and are likely to continue doing so over the next five years, as seen in Figure 3.

Figure 3 | Liquid Biopsies' Impact on the Future of Cancer Care



Source: Milken Institute (2025)

IMPACTS ON THE FUTURE OF CANCER TREATMENT AND MONITORING

Returning Test Results Faster

Evidence shows liquid biopsies offer a faster turnaround time for delivering test results than more invasive counterparts like tissue biopsies.[29] For example, comprehensive genomic profiling assays typically return results in five to seven days, compared to about three weeks for tissue biopsy results. Unlike tissue biopsies, which often involve surgical procedures and specialized clinical staff, equipment, and facilities, blood-based liquid biopsies can be collected or performed by a phlebotomist, cutting down scheduling time frames.[30] The laboratory processing turnaround time is also typically faster, allowing for results that can influence treatment decisions more quickly.[31] This is particularly relevant for patients with aggressive disease or those who are medically frail, for whom waiting for test results or undergoing repeated tissue biopsies is infeasible.[32]

The impact of faster turnaround times is demonstrated in real-world care settings. In a 2025 quality improvement study on nurse navigation and liquid biopsies in lung cancer care, incorporating liquid biopsies reduced treatment initiation from 36 to 21 days. It also shortened the time to treatment selection from 19 to 13 days.[33] These findings point to a broader opportunity tied to the quicker return of liquid biopsy results: using liquid biopsies to accelerate individual care decisions and streamline cancer care pathways systemwide.

While there is anecdotal evidence that workflow variability in health systems can cause processing delays that slow the return of liquid biopsy results, such delays can similarly affect tissue biopsy turnaround times. As liquid biopsies become more widely adopted, the turnaround time for ordering, scheduling, processing, delivering, and analyzing results will likely shorten.

Reduce Patient Burden

The ease of liquid biopsies can appeal to patients who may otherwise be risk-averse or hesitant when considering monitoring options. Interviewees noted that, in many cases, blood-based tests allow patients to avoid repeated scans or biopsies, which can be physically taxing and logistically complex, especially for those who are balancing ongoing cancer treatment with work, caregiving demands, and other responsibilities. For these patients, liquid biopsies are helping minimize the physical and logistical strain associated with treatment planning and therapy selection.

Liquid biopsies have already become standard in advanced cancer care, and further progress is anticipated to expand broader adoption and coverage. They are increasingly applied in post-treatment monitoring and MRD detection, where they offer the potential to further reduce patient burden by replacing the need for frequent imaging and in-person follow-up.

A study presented at the American Society of Clinical Oncology Annual Meeting 2023 found that liquid biopsies for regular blood-based monitoring of cancer patients helped detect recurrence earlier than traditional scans and reduced the need for frequent in-person visits.[34] This is particularly important for patients facing transportation challenges and those with limited access to advanced imaging facilities.

As evidence builds and coverage policies evolve, the integration of liquid biopsies can become standard in long-term monitoring. It is a patient-centered approach that balances clinical accuracy with quality of life. Shifting post-treatment monitoring from high-touch, resource-intensive interventions to simple, repeatable blood draws could redefine how patients live well during and after cancer treatment.

Realize Personalized Care

Liquid biopsies have already reshaped cancer care through treatment selection and have been rapidly expanding their monitoring and MRD testing applications. Blood-based comprehensive genomic profiling is supported by guidelines and is widely used in lung, colorectal, and 17 other types of cancer, allowing patients to access therapies without delay. Similarly, MRD testing is already in clinical use, with broad Medicare coverage in CRC and growing adoption in other tumor types. Multiple studies show that MRD liquid biopsies can predict relapse after treatment, in addition to their other monitoring applications.[35] Most MRD assays are laboratory-developed tests, which do not require FDA approval for guideline inclusion or clinical uptake, differentiating them from screening assays, where regulatory approval is often required. Evidence from numerous studies demonstrates that MRD assays can predict relapse, guide adjuvant therapy decisions, and detect recurrence earlier than imaging, allowing clinicians to adapt treatment sooner.[36]

MRD testing is being used in patients with cancer to personalize treatment by monitoring for therapeutic response and disease progression. By continuously monitoring tumor evolution through circulating biomarkers like ctDNA, clinicians can make informed, timely decisions based on the patient's evolving cancer profile.[37] Clinicians then monitor therapy by tracking tumor evolution and treatment response, assessing whether current therapies work and adjusting accordingly. This informed personalization can be seen in the application of MRD-based liquid biopsies in patients receiving immunotherapy with immune checkpoint inhibitors (ICIs). Although ICIs offer significant treatment benefits, their effectiveness varies, and only a subset of patients experience prolonged tumor shrinkage or disappearance following treatment.

Beyond informing treatment choices, liquid biopsies can identify emerging resistance mutations and therapeutic targets that are more likely to be effective in treatment.[38] This helps ensure treatment selection remains closely aligned with the cancer's biological behavior, improving outcomes while minimizing patient exposure to unnecessary toxicity.[39]

Experts predict liquid biopsies will be used even more broadly in the future to monitor tumor burden dynamics, track cancer progression or prognosis, and regularly adapt treatment in real time.[40] Therapies could be adjusted as resistance mutations emerge or as new actionable targets are identified, enabling dynamic and personalized care. However, the lack of consistent reimbursement and coverage for liquid biopsy testing, specifically in a treatment setting that relies on serial monitoring, may discourage clinicians from adopting these diagnostic tests.

Nevertheless, the predictions are already materializing. The SERENA-6 trial recently demonstrated that ctDNA monitoring could successfully identify ESR1 mutations in patients with metastatic breast cancer and guide earlier intervention with camizestrant.[41] Based on these findings, AstraZeneca is seeking FDA approval for camizestrant with a ctDNA monitoring companion diagnostic. This milestone underscores that ctDNA monitoring is on the cusp of broader availability to patients, highlighting the need to establish reliable pathways to access that keep pace with innovation.

Reduce Treatment Costs

Given their potential for detecting cancers in earlier stages and enabling providers to identify personalized treatments, liquid biopsies may reduce costs associated with treating later-stage or metastatic disease, including costs of hospital admissions, complications, and ineffective treatments. Liquid biopsies could also help patients avoid unnecessary treatment and streamline care pathways, which saves money for patients, payers, and the broader health-care system.

Evidence suggests liquid biopsies are cost-effective across many clinical applications. A review of 24 economic analyses found that 75 percent of studies determined liquid biopsies to be cost-effective compared to standard care or no screening.[42] Most notably, the cost-effectiveness of liquid biopsies has been established in selecting treatments for lung cancer patients and in screening and early detection of colorectal, gastric, breast, brain, and other cancers.[43] Additionally, most health and budget impact studies, particularly those focused on treatment selection for lung cancer, reported either cost savings or only minimal-to-moderate budget impact, reinforcing liquid biopsies' role in value-based care models.

The current cost of liquid biopsies and likelihood of reimbursement are in flux. Most liquid biopsies used in a screening setting are not reimbursable, and many assays used to monitor patients during treatment are not reimbursable or are inconsistently covered, with manufacturers often absorbing the cost to ensure patients receive necessary tests. Test prices vary widely from about $950 for MCDs to over $5,000 for an advanced genomic profiling assay.[44] While the literature review indicated two studies showing cost-saving benefits for using liquid biopsies in monitoring treatment response, economic evidence is limited for other clinical uses, such as prognostication, evaluating risk of relapse, and monitoring disease burden.[45]

Even though the cost-saving potential of liquid biopsies is promising, if we hope to fully realize their economic benefits, clearer reimbursement frameworks will be needed, along with continued innovation to incentivize competition and reduce testing costs.

IMPACTS ON THE FUTURE OF CANCER SCREENING

Increase Screening Concordance

Although cancer screenings recommended by the US Preventive Services Task Force (USPSTF) are covered at no cost to patients, cancer screening remains low. According to the Prevent Cancer Foundation's 2025 annual nationwide survey, only 51 percent of US adults had a routine medical appointment or cancer screening in the past year, a 10 percent drop from 2024.[46] Screening rates are especially low in underserved communities, where structural barriers, limited access to specialty care, and distrust of medical institutions persist.[47] These disparities contribute to delayed diagnoses and poorer outcomes.[48] Additionally, a FasterCures-led focus group in 2023, The Impact of Insight: Patient Preferences in Novel Screening Technologies for Cancer, revealed most patients preferred minimally invasive or noninvasive screenings, especially screenings that did not increase the risk of complications or cause pain.[49]

The FDA approval and Medicare coverage of the blood-based test for CRC screening demonstrate that liquid biopsy screening is no longer purely prospective but is already available. Although no MCD tests are currently recommended by guidelines, many experts anticipate that as test sensitivity and specificity increase and stronger clinical evidence supports utility in a screening setting, MCD tests will likely increase screening concordance and coverage will expand. This perspective was echoed across interviews with clinicians, researchers, diagnostic developers, and patients. The relative ease of testing could help overcome barriers linked to fear of invasive procedures, logistical challenges, availability of screening services, and distrust in the health-care system.

While liquid biopsies can offer a noninvasive alternative to people who might otherwise remain unscreened, experts underscore that blood-based assays require follow-up testing if a positive signal is detected. Therefore, patients must be fully informed about further tests that might be necessary. For CRC screening, the diagnostic process using liquid biopsies mirrors that of other screening methods, such as the fecal immunochemical test (FIT), which require a colonoscopy to confirm a positive result. Still, liquid biopsies have the potential to meaningfully increase national screening concordance if paired with appropriate follow-up.

Detect Cancer Earlier and Expand the Screening of New Cancers

Emerging data suggest that some liquid biopsies in screening for asymptomatic populations can detect certain types of cancer in earlier stages. However, performance varies by test and cancer type.[50] For single-cancer detection assays, sensitivity is already strong in certain early stages. The sensitivity for one particular assay is 100 percent for Stage II CRC and lower for Stage I.[51]

By contrast, most MCD assays have shown higher sensitivity in later-stage or metastatic disease and more limited sensitivity in Stage I disease.[52] There is likely the greatest potential for earlier detection in cancers we do not currently have screening modalities for, such as pancreatic or ovarian cancers, where patients

are routinely diagnosed with late-stage or metastatic disease when they become symptomatic. However, experts caution that it is premature to say liquid biopsies can outperform, or even match, standard-of-care screening methods.[53] Nevertheless, there is broad anticipation that through additional research and development—including prospective studies and randomized controlled trials—and through the use of AI and machine learning, there will be some screening assays that can identify cancer in earlier stages.

One key initiative underpinning this broader effort is the National Institutes of Health's Cancer Screening Research Network (CSRN), launched in 2024 to evaluate emerging cancer screening technologies like MCDs. As part of this effort, the CSRN launched the Vanguard Study, a pilot to help inform the design of larger randomized controlled trials evaluating MCD tests for cancer screening.[54]

A stage shift, where more cancers are identified at earlier, more treatable stages, is viewed as another likely outcome of expanded adoption of liquid biopsies because of their anticipated ability to detect cancer earlier than current recommended methods. This shift will depend on the technical performance of these assays and greater patient participation. For instance, blood-based CRC screening, while unlikely to achieve the same clinical performance as colonoscopy, could meaningfully increase early detection by reaching individuals who otherwise would not undergo screening. It is then probable that this early detection will incentivize and accelerate research and development of novel therapies or the application of currently available treatments for earlier-stage disease. Additionally, as we explored in a previous FasterCures report, ***The Promise of Multi-Cancer Early Detection Technologies in Encouraging Research & Development***, routine earlier detection of cancer will likely stimulate scientific investigation into the biology of early-stage cancer and its progression patterns, and spark research to support treatment of early-stage disease.

Liquid biopsies can also potentially screen for cancers for which no current screenings exist. The USPSTF recommends screenings for four types of cancer: breast, cervical, colorectal, and lung.[55] However, nearly 71 percent of cancer-related deaths are from cancers that have no recommended screening, such as pancreatic, ovarian, and certain gastrointestinal cancers.[56] These cancers are often diagnosed at advanced stages due to anatomical location, vague symptoms, or lack of diagnostic tools.[57]

Particularly, MCD tests present an opportunity to screen for cancers responsible for the highest mortality and those for which we do not have current screening modalities. Experts characterize the integration of liquid biopsies into routine screening as a paradigm shift, enabling earlier detection of cancers that typically present at later stages, when survival rates are low and treatment options are few. There is widespread interest in MCDs, though it is essential to note that there are ongoing large-scale studies, such as the NHS-Galleri trial, to evaluate their clinical utility and accuracy in detecting multiple cancers and their ability to reduce the number of late-stage diagnoses.[58] Although results from such trials are still several years away, experts expect these tests will continue to be refined and improved over time.

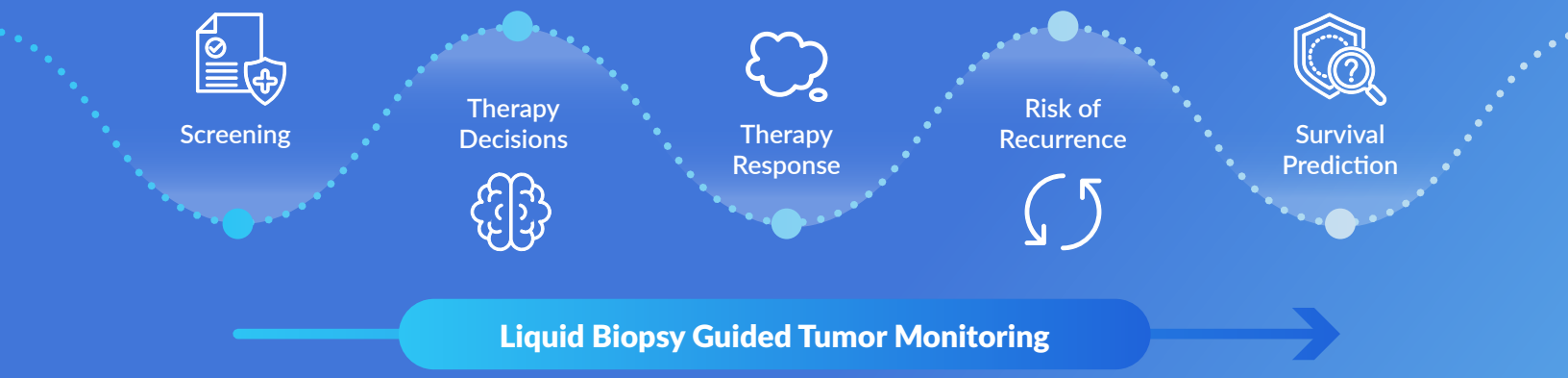
Experts anticipate liquid biopsies becoming more routinely integrated into preventive care across various settings. As access expands and liquid biopsies become more reliably capable of detecting cancers not typically identified through standard screening measures, more people will likely be diagnosed before symptoms develop.

CASE STUDY

CRC AS A BLUEPRINT FOR IMPLEMENTATION OF LIQUID BIOPSIES

CRC offers a compelling case study for understanding liquid biopsies' growing impact on cancer care. As a high-incidence, high-mortality disease with rising rates among younger adults, CRC presents an urgent clinical challenge and strategic opportunity to advance noninvasive diagnostics.[59] It is the only cancer with blood-based assays already in clinical use across the cancer care continuum, as illustrated in Figure 4. In addition to broad adoption of liquid biopsy for therapy selection in CRC, it is the first solid tumor to receive reimbursement for MRD testing and the first cancer type with an FDA-approved blood-based screening assay. This includes screening with tests like Guardant Health's Shield, the first blood-based test approved by the FDA as a primary screening option for CRC screening in average-risk adults.[60]

Figure 4 | Liquid Biopsies' Use Across Colorectal Cancer Journey



Source: Milken Institute (2025)

In a metastatic setting, liquid biopsies provide more than just a fallback when tissue is inaccessible or insufficient. Genomic profiling tools like Guardant360 and FoundationOne Liquid CDx offer rapid, noninvasive insights into key mutations (e.g., KRAS, NRAS, BRAF, HER2, and ESR1) to inform targeted therapy.[61] In postsurgical care, Guardant Reveal and Natera's Signatera are being used to detect MRD, with recent findings showing that ctDNA-positive patients after surgery have up to 10 times worse overall survival compared to ctDNA-negative patients.[62] MRD clearance during adjuvant chemotherapy has emerged as a strong predictor of long-term remission, and serial ctDNA testing is increasingly being incorporated into surveillance strategies to monitor for recurrence and guide follow-up care. These assays demonstrate CRC is not simply a target of innovation but an active environment in which liquid biopsies deliver.

Innovation in diagnostics for CRC benefits from a rare convergence of enabling factors, including high disease burden, well-established screening guidelines, biological feasibility of ctDNA detection, and strong commercial and reimbursement viability. Indeed, the science, market, and system are aligned, making it an ideal testing ground for rapid innovation. Biologically, CRC tumors shed ctDNA at high levels,[63] enhancing test sensitivity, even at early stages.[64] Clinically, CRC screening is anchored in established guidelines, allowing blood-based assays to be added to existing workflows and benchmarked against long-standing modalities such as FIT and colonoscopy in the path toward payer coverage. With existing infrastructure and payer support,[65] CRC offers a unique test case for how other tumor types might adopt liquid biopsies across prevention, therapy selection, treatment, and survivorship.

The key impacts we outline in this report, from earlier detection and treatment personalization to real-time monitoring and reduced patient burden, are already beginning to emerge in CRC. In the years ahead, we expect similar trends to take shape across other tumor types as liquid biopsies mature and move into broader clinical use. CRC demonstrates that these impacts are not just hypothetical but achievable and increasingly underway.

CONCLUSION

Liquid biopsies are redefining how cancer is detected, monitored, and treated, promising earlier detection, more personalized treatments, and broader access to care. These shifts can strengthen the health system's ability to manage rising cancer incidence with greater efficiency. Realizing this future depends on overcoming persistent challenges, including adapting regulatory and reimbursement frameworks, strengthening clinical infrastructure, preparing providers to use these tools effectively and appropriately, and ensuring these advances reach all patients.

Historically, medical innovations outpace adoption and integration into clinical practice. This is true for the recent advancements in liquid biopsies. Despite the remarkable progress made over the past decade, there is still a gap between liquid biopsies' transformative potential and widespread adoption. Conversely, using liquid biopsies across the cancer care continuum in real-world practice will likely outpace findings from ongoing clinical trials because these tests are already commercially available, even as the evidence base grows.[66]

As the ability to monitor patients throughout their cancer treatment improves, patients could experience longer life expectancy and improved quality of life during and after treatment. With cancer increasingly managed as a chronic or curable condition, rather than a terminal diagnosis, stigma, fear, and uncertainty associated with a cancer diagnosis could diminish, reshaping patients' lives.

Our future work and forthcoming report in this series will consider the barriers to widespread adoption and use across multiple stakeholders, and it will identify solutions to ensure the health system is prepared to implement innovative diagnostics like liquid biopsies. Achieving this vision demands a focused, collaborative effort, but the reward is clear: a more responsive, prevention-focused, and forward-looking cancer care system.

ENDNOTES

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ACKNOWLEDGMENTS

We want to thank the many experts we interviewed and consulted to develop this report. We would especially like to thank Guardant Health for its support of this initiative.

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