

Estimates suggest that approximately **1 in 5 people** will develop cancer in their lifetime.¹

Cancer research

Paving the way

Optimizing liquid biopsy workflows from sample preparation to analysis

Thermo Fisher Scientific empowers liquid biopsy and oncology research applications with flexible and comprehensive solutions designed to support cancer analysis workflows at every stage, ensuring that researchers have tools they need to conduct thorough and accurate studies.

Liquid biopsy has emerged as a powerful complement to conventional solid tumor biopsies by enabling cancer investigation through a less-invasive process of collecting blood and other body fluids.

Analyte extraction tools with high purity and yield ensure enough sample is

available for analysis of low concentration analytes such as ctDNA and circulating tumor cells (CTCs).

Sensitive genomic and proteomic analysis technologies can help reveal potential biomarkers for dynamic tumor characterization, progression, and treatment response.



Nucleic acid isolation

Molecular profiling of nucleic acids found in blood, plasma, serum, and other liquid biopsy samples may enable researchers to detect cancer-specific variants, providing potential early warning signs of tumor growth or recurrence. Total nucleic acid analysis may provide a more thorough understanding of gene expression of cancer-associated variants, potentially yielding new insights into individual cancer risk and immune response.

Cell-free nucleic acid isolation

[Applied Biosystems™ MagMAX™ Cell-Free DNA Isolation Kit](#)

[Applied Biosystems™ MagMAX™ Cell-Free Total Nucleic Acid Isolation Kit](#)

Sequential DNA and RNA isolation

[Applied Biosystems™ MagMAX™ Sequential DNA/RNA Kit](#)

Genomic DNA isolation

[Applied Biosystems™ MagMAX™ DNA Multi-Sample Ultra 2.0 Kit](#)

Total RNA isolation

[Applied Biosystems™ MagMAX™ mirVana™ Total RNA Isolation Kit](#)

Studies suggest that **5-year survival rates** for blood cancers have risen significantly over the past 40 years.^{2,3,4}

Circulating tumor cells and extracellular vesicle isolation

Circulating tumor cells (CTCs) and extracellular vesicles (EVs) are released by cancer cells into the bloodstream. When found in body fluids, these biomolecules can potentially reveal signs of metastasis, rates of cancer cell growth, or response to treatment. The cargos found in EVs enable research analysis into the prevalence and identity of cancer-specific bioactive DNA, RNA, and protein as they are transported between primary and secondary tumors, which may yield understandings into cancer progression and therapeutic development.

Circulating tumor cell isolation

[Invitrogen™ Dynabeads™ magnetic beads](#)

Tumor cell enrichment

[Invitrogen™ Dynabeads™ Epithelial Enrich magnetic beads](#)

Exosome isolation

[Invitrogen™ Dynabeads™ Intact Virus Enrichment beads](#)

When cancer is diagnosed early, the overall 5-year cancer-specific survival rate is **4 times higher** than when cancer is diagnosed late.⁵

Supporting the trusted diagnostic test: tissue biopsy

As liquid biopsy evolves, tissue biopsy continues to be widely used in confirming cancer diagnosis. Advancements in liquid biopsy often rely on solid tumor biopsies for complementary studies, which makes overcoming typical challenges with tissue sample types crucial. Maintaining tissue integrity and obtaining quality nucleic acids for downstream analysis can provide researchers with a depth of molecular information directly from the malignant tissue.

Nucleic acid isolation from formaldehyde-fixed or formalin-fixed, paraffin-embedded (FFPE) tissue

[Applied Biosystems™ MagMAX™ FFPE DNA/RNA Ultra Kit](#)

FFPE deparaffinization

[Applied Biosystems™ AutoLys M Tubes and Caps](#)

Nucleic acid isolation from fresh-frozen tissues

[Applied Biosystems™ MagMAX™ DNA Multi-Sample Ultra 2.0 Kit](#)

Eliminate exposure to organic solvents with AutoLys M Tubes and Caps and MagMAX FFPE kits.

Using our sample purification solutions with a Thermo Scientific KingFisher instrument can decrease touch-points by as much as 75%.

Automated sample preparation

[Thermo Scientific™ KingFisher™ automated purification systems with MagMAX or Dynabeads solutions](#)

Genetic analysis to decode malignancies

Innovation in molecular analysis technologies have the potential to take liquid biopsy techniques into clinical practice. Specific and sensitive assays can provide researchers with the ability to detect low-level targets found in liquid biopsy samples. Automated platforms can help provide added efficiency and the consistency needed for clinical translational research into cancer diagnostic development and personalized treatment studies.

Nucleic acid and protein quantification

[Invitrogen™ Qubit™ Fluorometers and assays](#)

[Thermo Scientific™ NanoDrop™ microvolume spectrophotometers](#)

Digital PCR (dPCR)

[Applied Biosystems™ Absolute Q™ dPCR systems, assays, and reagents](#)

High-resolution capillary electrophoresis

[Applied Biosystems™ genetic analyzers, kits, and reagents](#)

[Applied Biosystems™ TrueMark™ MSI Assay](#)

Next-generation sequencing (NGS) library preparation

[Ion Torrent™ Ion Chef™ System](#)

[Applied Biosystems™ MagMAX™ Pure Bind beads](#)

[Invitrogen™ Dynabeads™ Streptavidin for Target Enrichment](#)

NGS sequencing analysis

[Applied Biosystems™ Ion GeneStudio™ S5 systems](#)

[Ion Torrent™ OncoPrint™ assays](#)

[Ion Torrent™ Ion AmpliSeq™ HD panels](#)

Detect and quantitate rare targets with **mutation allele frequencies as low as 0.1%** with Absolute Q dPCR systems.

Accelerating discoveries with immuno-oncology, proteomics, and cell analysis

Success in understanding complex interactions and characteristics of cancer and the advancement of immuno-oncology therapies relies on a knowledge of the underlying interactions of cancer cells and tumor microenvironment. Evolving research in proteomic and multi-omic analyses may support complex development of targeted therapy for future clinical use.

Protein and cell detection and analysis

[Western blotting solutions](#)

[Proteomics mass spectrometry](#)

[Flow cytometry](#)

[Cell function assays](#)

[Cell imaging](#)

[Immunoassays for immuno-oncology](#)

[Immunoassays for cancer progression](#)

A broad range of **protein and cellular analysis tools** help paint a more holistic picture.

References

1. Bray F, Laversanne M, Sung H, et al. (2022) *CA Cancer J Clin* 74(3):229-263.
2. Blood Cancer UK (2019). Accessed August 1 2024. <https://bloodcancer.org.uk/news/blood-cancer-survival-rising-faster-other-common-cancers/>
3. Leukemia & Lymphoma Society (2023). <https://www.lls.org/facts-and-statistics/facts-and-statistics-overview>
4. Hemminki K, Hemminki J, Försti A, et al. (2023) *Leukemia* 37:854–863 (2023).
5. American Association for Cancer Research. Cancer progress report 2023. <https://cancerprogressreport.aacr.org/progress/>

Explore our end-to-end workflow solutions thermofisher.com/cancerworkflows

