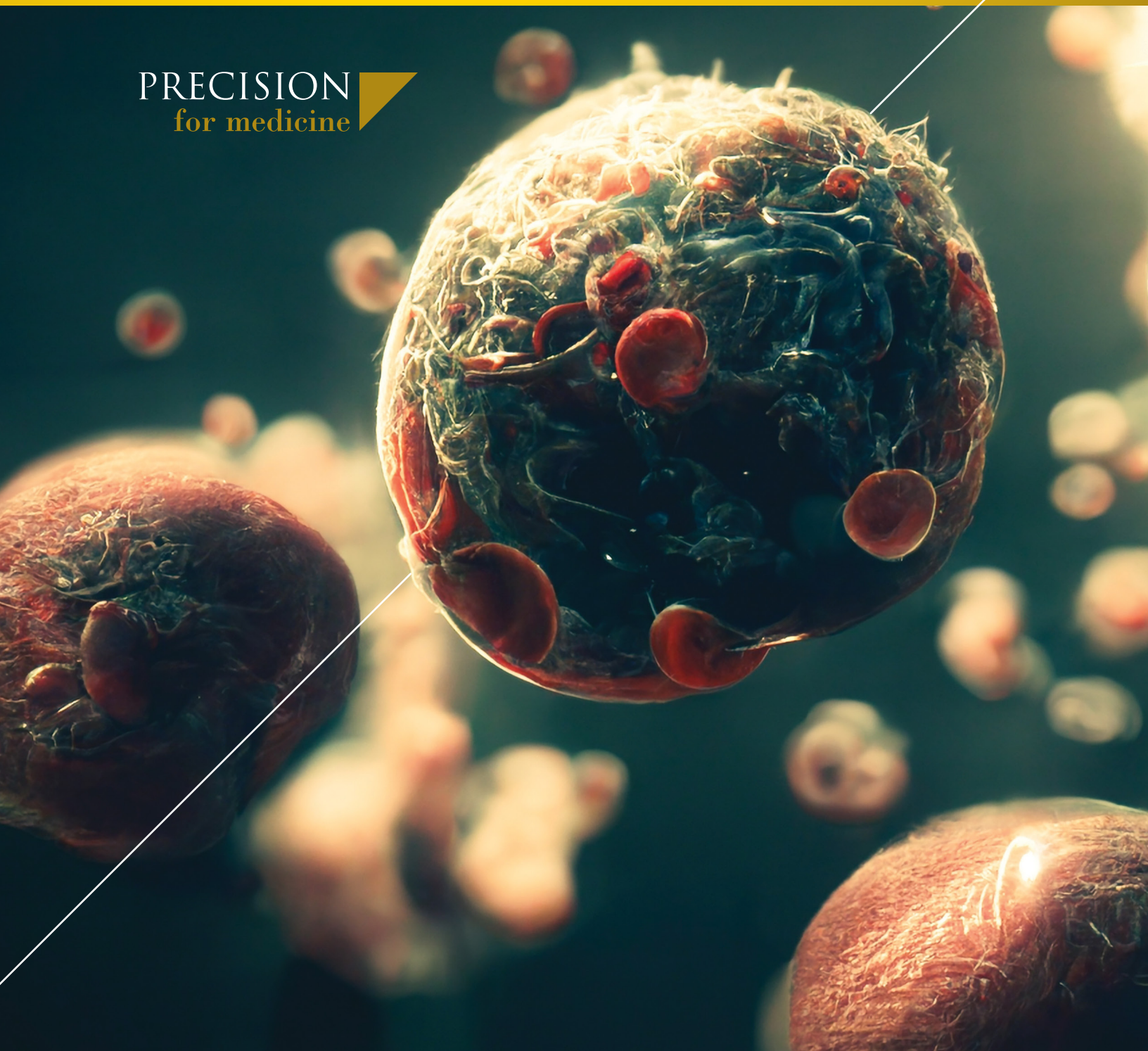


# Liquid Biopsy Solutions

PRECISION  
for medicine





## Advanced and Proprietary Technologies for Liquid Biopsy

Liquid biopsy, including analysis of circulating tumor cells (CTCs), cell-free DNA (cfDNA), and exosomes present in the blood, can provide quantitative and qualitative data on prognostic, predictive, pharmacodynamic, and clinical response biomarkers. Liquid biopsy can also enable the characterization of disease evolution and resistance mechanisms, helping guide development of new treatments and improving patient outcomes.

Unlike traditional biopsies, liquid biopsies are minimally invasive and easily repeatable. However, looking for cancer biomarkers in circulating nucleic acids and CTCs requires high levels of sensitivity in QC and detection methods, as well as robust and reproducible assays.

Precision for Medicine specializes in combining platform technologies into optimized, automated, and reproducible workflows for detailed analysis of CTCs, cfDNA, and exosomes, including our in-house, proprietary CTC enrichment technology, ApoStream®.

# Liquid Biopsy Analysis at Precision for Medicine



## Plasma/serum analyses:

- Cytokines
- Cell-free DNA
- Cell-free RNA
- Exosomes



## Custom liquid biopsy specimens available:

- Oncology, immunology, and cardiology indications
- Matched surgical biopsies



## Clinical Sample

Clinical sample (PFM generates custom kitting specifically for liquid biopsy)



## ApoStream Cell Separation and Enrichment



## Concentrated CTCs

### Analyses

- Quantitative immunofluorescence
- Functional assays
- Culture patient-derived xenograft (PDX) models
- Checkpoint biomarkers
- DNA/RNA assays (NGS, ddPCR)
- Single-cell RNA-seq
- CLIA-validated assays for real-time patient enrollment and selection



## Concentrated Peripheral Blood Mononuclear Cells (PBMCs)

### Flow Cytometry

### Immunophenotyping:

- T-cell subsets
- B-cell subsets
- Macrophages
- Dendritic cells
- Checkpoint biomarkers

# Robust liquid biopsy results begin with custom kit development and biospecimen management to safeguard samples from draw to analysis

The most critical step in clinical sample analysis starts with obtaining and managing samples. Precision excels in all steps required to ensure the right samples are collected, processed, and transported to exactly where they need to be.

## Clinical Kitting Specifications

- Kitting facility designed specifically for custom kit development
- Trial and visit specific kits
- Multiple sample type kitting
- Detailed kit status reporting
- Kits built and shipped from dedicated facilities in the United States and Europe
- Validated kit for ApoStream®

## Clinical Site Training

- Collection-specific QA plans
- Development of training documentation
- Competency and monitoring programs



Custom Kit Production



Clinical Site Training



Global Shipping and Logistics



Supply Chain Management



Online Management, Tracking, and Reporting

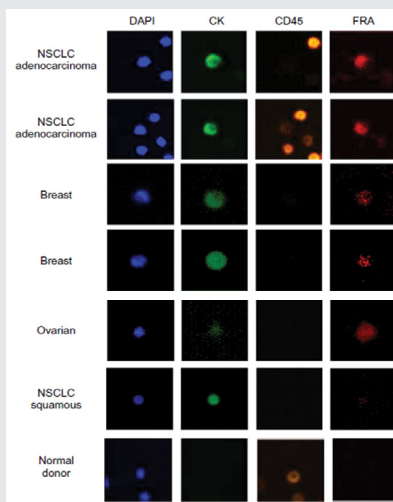
ApoStream®

# Unlock the benefits of CTC liquid biopsy with Precision's ApoStream

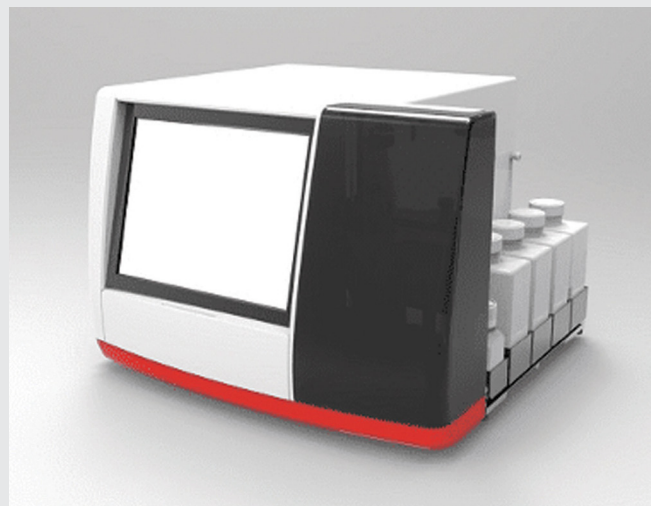
Using circulating tumor cells for liquid biopsy is complicated by the relative rarity of CTCs in the bloodstream. Precision's complete solution for CTC liquid biopsy is enabled via ApoStream, a proprietary device that isolates and enriches CTCs, facilitating any type of downstream analysis, such as multiplex quantitative immunofluorescence or FISH/ISH. ApoStream can also be used to collect other rare cell types, such as stem, progenitor, and differentiated immune cells, including CAR-T cells and other difficult-to-identify immune cell populations for immuno-oncology applications.

## ApoStream Highlights

- Antibody-independent rare cell capture
- Enriches rare cells present in low frequencies from biofluids
- Small starting volume
- No binding with target cells during processing
- Minimal cell loss during processing steps
- Compatible with multiple downstream biomarker assays (NGS, ddPCR, quantitative multiplex IF, FISH/ISH, etc)
- Parameters to control high recovery and high purity



FRA-positive CTCs isolated using ApoStream from patients with metastatic cancers, including non-small cell lung cancer, breast cancer, and ovarian cancer in a Phase 2 study



ApoStream Instrument for CTC capture

## Postenrichment Biomarker Analysis

# Characterize blood-based biomarkers with a multitude of available assays

Precision's methodology results in high specificity with superior recovery rates and purity, allowing for the most relevant enriched populations to be further characterized in multiple ways. This multiplatform approach can be especially beneficial in complex development programs, including immuno-oncology, autoimmune, and neurology therapeutic development. Precision has CLIA-validated assays for using CTCs in real time for patient enrollment and selection into clinical trials.



### Quantitative Multiplex Immunofluorescence

- Concurrent visualization of up to 9 markers
- Spatial distribution of cell types in a sample
- Prequalified IF panels targeted to a selection of different cancer types to deliver cytology information



### Fluorescence In Situ Hybridization

- Detect cellular genetic aberrations: multiploidy, translocations, amplifications, or deletions
- Custom FISH probe design services
- Commercially available FISH assays
- Proprietary disease-specific FISH panels



### Genomics Analysis

- Validated NGS for cfDNA (TSO500, OncoPrint Precision Assay)
- ddPCR for cfDNA (targeted variants)

## Example analyses by liquid biopsy product



### CTCs

- Multiple DNA abnormalities
- CTC numbers
- RNA expression and fusion transcripts
- Protein expression
- In vitro/in vivo culture



### cfDNA

- Amplification and deletion
- Translocation
- Point mutations
- Chromosomal abnormalities
- Number of mutant molecules



### Exosomes

- Protein expression
- Nucleic acid applications
- Neuron health and status (neuron-derived exosomes)

## Analyze CTCs with transcriptomics at the single-cell level

Probe genetic material of CTCs at the single-cell resolution to study dynamics in circulation and use single-seq technology to improve the sensitivity of gene expression profile of CTCs. Precision's scientific experts can recommend a validated panel or other approach to suit your study.



### Applications

- Whole transcriptome or targeted gene expression
- Multiomic Profiling – Cell Surface Protein



## Liquid Biopsy Specimens

# Research-ready cell-free DNA (cfDNA) specimens, protocol controlled, precisely handled, available next-day to your lab or ours

Every liquid biopsy specimen from Precision for Medicine is accompanied by deep clinical and diagnostic annotation to enable you to correlate your findings.

### Custom liquid biopsy specimens

- Same-day or next-day
- Oncology, immunology, and cardiology indications
- Matched surgical biopsies (FNA, FFPE, or fresh frozen) or NGS biopsy report
- Healthy and at-risk controls (age-/gender-matched)
- Pre-treatment, post-treatment
- Longitudinal (serial) collections
- Custom kit design and distribution

### Deeply characterized

- Demographics
- Disease status and staging
- Procedure reports (including pathology)
- Medical history and comorbidities
- Treatment history, response, and outcomes
- Next-generation sequencing data
- Longitudinal data
- Patient re-access and recall

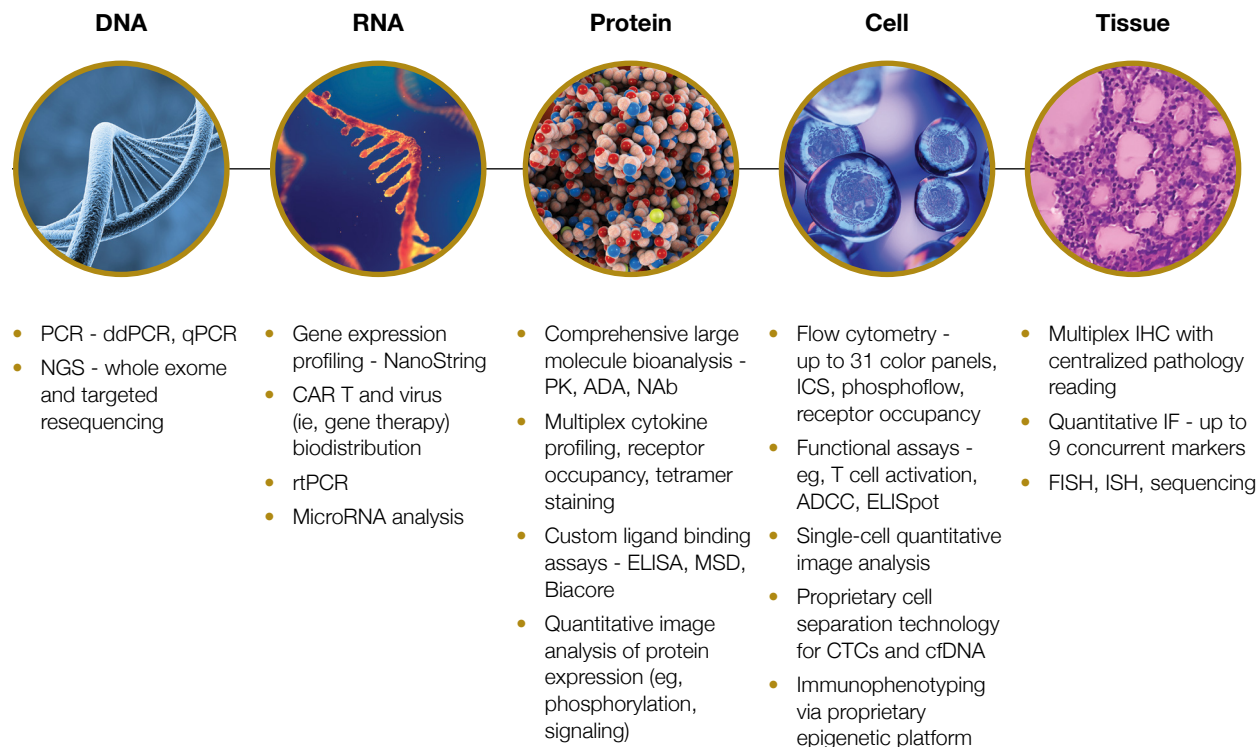


# Solving the most complex challenges in biomarker-driven and precision therapeutic development

Precision for Medicine is the first clinical research services organization engineered to support life sciences companies in the use of biomarkers essential to targeting patient treatments more precisely and effectively. Combining deep scientific expertise, clinical trial excellence, and advanced approaches for data science, Precision accelerates therapeutic development from the late preclinical phase through commercialization.

- 7 specialty labs throughout North America and Europe
- Sample processing labs on 5 continents
- Central lab services, including custom kitting, logistics, processing, and storage
- Assays available under GxP, CLIA, CLSI, CAP, ISO 9001/13485

Comprehensive suite of technologies, capabilities, and proprietary approaches to interrogate any sample type



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