

Circulating Tumor Cell / Liquid Biopsy Research Core

Purpose: Circulating tumor cells (CTCs) are cancer cells shed by solid tumors into the bloodstream. CTCs have recently emerged as valuable prognostic and predictive cancer biomarkers, providing a non-invasive window into disease biology and progression that can be sampled repeatedly over time from a simple blood draw. Moreover, CTC sampling enables real time tracking of cancer phenotypes as tumor cells evolve over time and through progressive lines of therapy, thereby elucidating mechanisms of cancer dissemination and resistance and identifying new therapeutic targets. Thus, CTC analysis holds the promise of advancing precision medicine by enabling real-time molecular characterization of individual cancer patients' tumors at diagnosis and throughout treatment. The USC Norris CTC Research Core is a state-of-the-art, multi-platform facility for the capture and analysis of peripheral blood CTCs. The Core employs a variety of technologies that enrich CTCs and match plasma for enumeration or molecular characterization. Enrichment is done from blood samples drawn by standard venous puncture from patients. In addition, Dr. Goldkorn's team has developed murine xenograft research models using labeled CTCs that can be recovered from the mice.



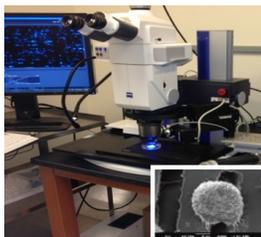
RareCyte + Leica RX^m: Analyses all nucleated cells (no enrichment). Automated high throughput 4-channel staining (Leica) followed by high-content scanning and image analysis for CTC identification and robotic micropipette recovery (RareCyte). Use for CTC enumeration, protein and RNA -IF/FISH, and single CTC recovery for DNA/RNA profiling



CellSearch (Menarini/SBI): Automated, FDA-cleared immuno-affinity capture, enumeration and immunofluorescence (IF) protein profiling



Parsortix (Angle): Size-based microfluidic CTC enrichment for gene expression profiling



Parylene-C slot microfilters (USC/Caltech): Size-based live CTC capture for immunofluorescence (IF) and live cell assays (e.g. telomerase activity)



ClearCell FX (Clearbridge Biomedics): Size-based inertial focusing CTC capture for enumeration, immunofluorescence and genomic profiling



DepArray – 2nd generation (Silicon Biosystems/SBI): Dielectrophoretic cage capture, 6-channel IF, and single CTC recovery for DNA/RNA profiling



LiquidBiopsy (Cynvenio): Immuno-affinity capture for targeted sequencing of CTCs and matched plasma

CTC enrichment platforms available at USC Norris CTC/Liquid Biopsy Core

Facilities: The Core is located in the laboratory of Dr. Amir Goldkorn (Faculty Director) on the 6th floor of the Harlyne Norris Research Tower (HNRT 6516) in the USC Norris Comprehensive Cancer Center. For CTC capture, the laboratory offers the following platforms (see figure above for descriptions): 1. RareCyte + Leica; 2. CellSearch (Menarini/SBI); 3. Parsortix (Angle); 4. Parylene-C microfiltration (USC/Caltech); 5. ClearCell FX (Clearbridge); 6. DEPArray (Silicon Biosystems/SBI); 7. LiquidBiopsy (Cynvenio).

Access: The facilities are available to all USC investigators, as well as collaborators outside the university. The price for CTC enrichment and matched plasma and WBC recovery ranges from \$50/sample to \$550/sample, depending on the platform and desired application. Invoicing is set up through the online CORES system. Dr. Goldkorn and his staff assist investigators in choosing the most appropriate instrument for their experimental and clinical trial needs. Downstream molecular profiling can be discussed as well. Samples generally are received and processed during regular laboratory operating hours but also can be received during off-hours (e.g. weekend) by special arrangement when necessary.

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