Sort, Select and Save Pure Single Cells
Getting accurate downstream genetic results requires a method that addresses and eliminates sample heterogeneity. The DEPArray™ system’s unique technology helps you manage the most critical step in the process by isolating 100% pure target cells.

- Our proprietary, internationally recognized technology allows fully automated identification and isolation of rare cells, even single cells, with 100% purity.
- High quality image-based selection enables the identification of target cells from contaminants, cell clusters, and non-target cells. The patented method of automated cell routing allows pure, individual target cells to be recovered for further downstream analysis.

The DEPArray™ Instrument

Fully Automated Solution for Cell Isolation
The DEPArray™ Sample Cartridge

- The DEPArray™ single-use cartridge, combines state-of-the-art microfluidic and silicon biochip technology to gently manipulate each single target cell in an enriched sample. The process enables pure, viable cells to be recovered from a variety of different sample types.

- The DEPArray™ cartridge is also suitable for isolation of small or large pools of cells, allowing sorting and recovery of multiple cell populations from a single sample. The ability to isolate non-target cells, in addition to target cells, provides the opportunity to have an ideal internal negative control for downstream analyses.

Any Sample: just the cells you want

Enrichment Methods

- Bead-based
- FACS
- Density/Gradient-based
- Filtration-based
- Labeled Cell Suspension

Many sample types are suitable for use with DEPArray™ technology including:

- Culturing Cells
- Whole genome amplification
- Array CGH
- Whole genome sequencing
- Next generation sequencing
- Mutation and CNV analysis
- Expression analysis

Cells can be live or fixed, depending on the enrichment or sample preparation method.

- peripheral blood
- fresh frozen
- FFPE
- fine needle aspirates
- bone marrow
- pleural fluid
- urine
• The unique DEPArray™ technology is based on application of dielectrophoresis (DEP) principles to individual cells, through and array of electrodes.

• After an enriched sample of fluorescence-labeled cells is loaded into the DEPArray™ cartridge, the cartridge is inserted into the DEPArray™ system, where the cells are automatically injected into the main chamber and allowed to distribute.

• Activation of the cartridge electrodes generates a dielectric field, trapping every cell into a DEP virtual “cage.” A six-channel fluorescent microscope and CMOS camera enable identification of single cells that express the desired pattern(s) of fluorescent markers. High quality imaging and precise electronic control of cage motion in the microchip chamber enable unsurpassed performance in cell isolation and recovery.

• Each selected cell is moved to a “parking area” through an automated process. Once all target cells are in the parking area, cells can be recovered individually or in groups into a PCR tube, ready for further molecular investigation.

• Images of individual events can be viewed on the image bar, allowing specific cells of interest to be easily identified and confirmed. Cell perimeter, diameter, and circularity measures can be viewed with the brightfield channel ensuring recovery of whole intact cells exhibiting the desired fluorescence patterns.
Pure

Single

Viable

OncoLOgy Research

Fetal Cell Biology

Stem Cell Biology

The DEPArray™ system provides automated isolation and collection of individual cells. This unique feature enables molecular analysis of specific cells and cell subpopulations, which is critical to understanding the biological significance of rare cell subtypes within biological samples. By ensuring recovery of individual cells of interest, DEPArray™ technology allows genomic and expression analysis down to the single cell level.

Diestrophicoretic (DEP) cages are formed by the differential application of a very low voltage at megahertz frequencies. Capture and movement of cells in DEP cages is gentle; cells are not subject to shear force, strain, or potential damage from cell-cell adhesion. Cells do not need to be permeabilized or fixed, so even live cells in culture media can be analyzed and isolated. Cells can be recovered from the DEPArray™ cartridge directly to cell culture plates.

Cancer is a highly heterogeneous disease arising from genetic aberration that are either inherited or acquired. Most cancers have a unique set of molecular changes. Understanding the underlying molecular basis of cancer will have profound implications for developing new and better treatments and for developing predictive diagnostic tests.

- Recover individual tumor cells, even very rare circulating tumor cells (CTCs)
- Identify multiple subtypes associated with epithelial-mesenchymal transition
- Characterize tumor clonal subpopulations
- Compare genetic variation from different tumor cell sources, FFPE, blood, FNAs, …

With DEPArray™ technology, genomic heterogeneity can be studied at the single cell level. Each cell’s genetic story can be clearly elucidated detailing the overall genetic variability and uncovering driver mutations and clonal subtypes. In cases where single cell genomics are not necessary or could be impaired by sample quality, such as with FFPE samples, DEPArray™ technology allows the pooling of phenotypically like cells, separating them from unwanted contaminants, like stromal cells. Analysis of pure pooled tumor cells can confer significant advantages of less stringent sampling methods since any heterogeneity observed can be attributed to, and a measure of, the allelic frequency of the target cell population since all the background has been removed.

It has been known for some time that fetal cells cross the placental barrier and circulate in maternal blood. The ability to find and recover these cells could have a significant impact on prenatal genetic diagnostic testing by providing a less expensive and non-invasive procedure for securing fetal cells for genetic testing. Unfortunately, this field of research has been hampered by the rarity of fetal cells in circulation and their short half-life, making it difficult to validate fetal-cell specific biomarkers.

- Isolate fetal trophoblasts and nucleated erythrocytes from maternal blood
- Discover and validate fetal cell biomarkers

With DEPArray™ technology complete intact fetal cells can be recovered from enriched maternal blood samples. This means the entire fetal genome is available for testing including rare point mutations, not just common aneuploidies. By recovering pure single cells, the specificity of fetal cell biomarkers can be validated by comparing the genome from the recovered cells against maternal and fetal genomic controls.

Stem cell research has gained tremendous momentum over the past few years as new sources of stem cells have emerged and the regulatory environment has eased. Areas such as regenerative medicine, cancer and immunology all are investigating the role stem cells might play in improving treatments for disease.

- Recover primary cells from tissues for ex-vivo cell culturing and cloning
- Separate individual stem cells to characterize gene expression variation at the single cell level

With DEPArray™ technology individual stem cells can be recovered allowing variations in gene expression patterns amongst cells from the same clonal pool to be compared.

And since the DEP force exerted to move cells is gentle and culture media can be used as the sample buffer, stem cells can be maintained alive during sorting and recovery.
• Fabbri F, et al. AACR 2011 Poster (Abstract #4901) – “Preliminary investigation of circulating NSCLC cells using a dielectrophoresis-based instrumentation” – This study has been expanded and their paper has now been accepted for publication – see below for full reference.

• Medoro G, et al. ASCO 2011 Poster (Abstract #10530) – “Use of the DEPArray platform to detect, isolate, and molecularly characterize pure tumor cells from peripheral blood samples enriched using the CellSearch® system”

• Fontana F, et al. ASCO 2011 published abstract #6915 – “Sequencing the chemokine receptor CXCR4 in individual circulating tumor cells (CTCs) of patients with breast cancer (BrCa)”


• Peeters DJE, et al. AACR 2012 Poster (Abstract #4072) – “Molecular characterization of single tumor cells isolated from blood samples using immunomagnetic enrichment and dielectrophoretic cell sorting: a feasibility study”

• Polzer BM, et al. ACTC 2012 Oral Presentation – “Whole genome screen of single circulating tumor cells using a semiautomated workflow”

• Alpaugh RK, et al. San Antonio Breast Cancer Symposium 2012 Poster – “What is the appropriate sample(s) on which to perform sequencing for mutational analysis to guide the selection of targeted therapy?”


• Carpenter EL, et al. AACR 2013; Abstract accepted – “Dielectrophoretic capture and genetic analysis of individual disseminated solid tumor cells.”

• Wang YC, et al. WSCS 2013; Abstract accepted- “Dissecting molecular heterogeneity in pluripotent stem cells with single-cell resolution”


• Polzer BM, et al. ISMRC 2013 Abstract accepted- “Morphology and DNA integrity are defining criteria for diagnostic molecular profiles for single CTCs”

The DEPArray™ instrument is for Research Use Only and not intended for use in human diagnostic procedures. Silicon Biosystems, DEPArray™, CellBrowser™ and Ampli1™ are trademarks of Silicon Biosystems S.p.A.