



VisionSort™

MORPHOLOGY + AI FOR CELL SORTING



Fusing AI & morphology for precision cell analysis and sorting.

GO BEYOND MARKERS

Bringing together fundamental advances in optics, microfluidics, and artificial intelligence (AI), VisionSort empowers researchers to get more from their cells.

VisionSort was designed to deliver the all the capabilities you have come to expect from traditional fluorescence-only cytometers and adds the strength of morphological profiling and insights of AI. Go beyond conventional cytometry add a new dimension to your cellular analysis and sorting workflows with VisionSort.



VisionSort Features

USER DRIVEN AI

- Supervised and unsupervised machine learning
- Intuitive UI

HIGH RESOLUTION

- >4,000 data point 'cellular fingerprint' per cell
- <1 um cellular resolution



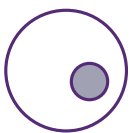
HIGH THROUGHPUT

- Analysis and sorting at 3,000 eps
- Fully closed system

DUAL MODE SORTING

- Label-free morphology and fluorescence based
- Gentle microfluidics-based sorting mechanism

DO MORE WITH YOUR CELLS



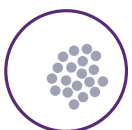
Isolate the cells you need

- Label-free for truly untouched cells in their native state
- Gentle microfluidics based sorting for high viability



Expand drug screening & development

- Phenotypic screening (CRISPR & small molecule)
- Targeted enrichment of immune & stem cells for cell therapy development



Identify new cell populations

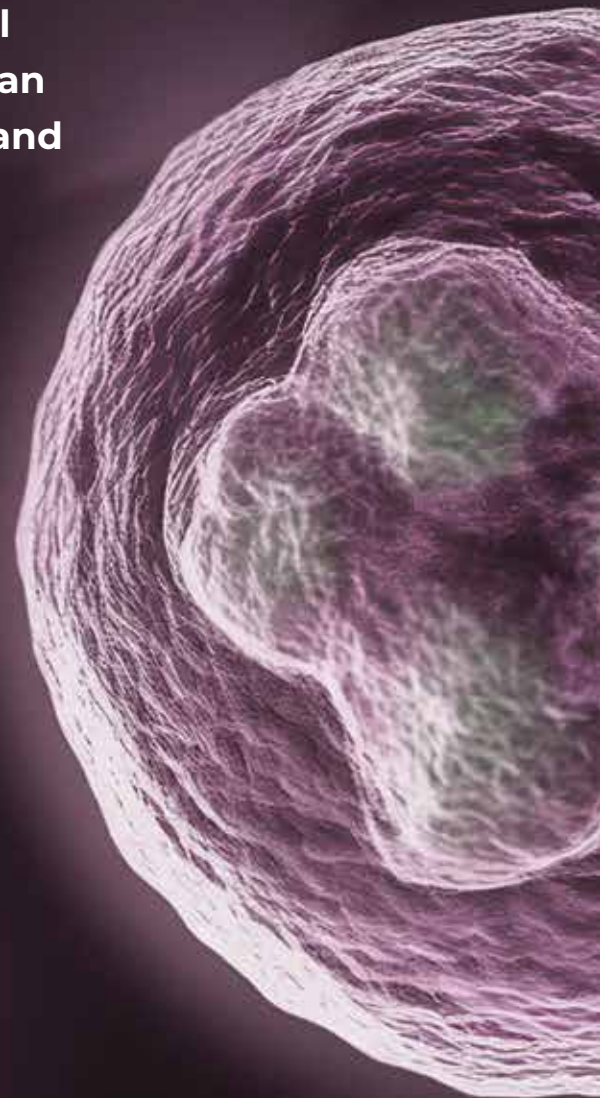
- Based on high resolution morphology and AI
- For biomarker ID and target discovery

CELL MORPHOLOGY

A KEY PHENOTYPIC READOUT

Cells adapt to environmental changes by altering their morphology – a critical readout of their phenotypic state. Current methods to assess and leverage changes in cell morphology for life science R&D are limited, low-throughput, and manual.

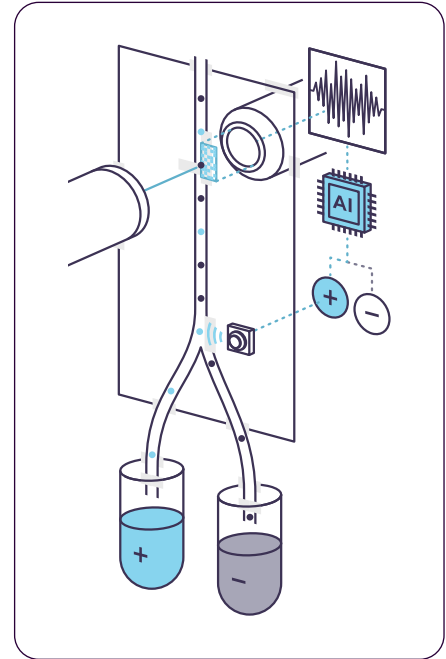
With VisionSort, researchers now have access to an ultra-fast, high dimensional readout of single cell morphology and can use this capability to advance research and development in Cell Therapy R&D, Drug Discovery, and Disease Profiling.



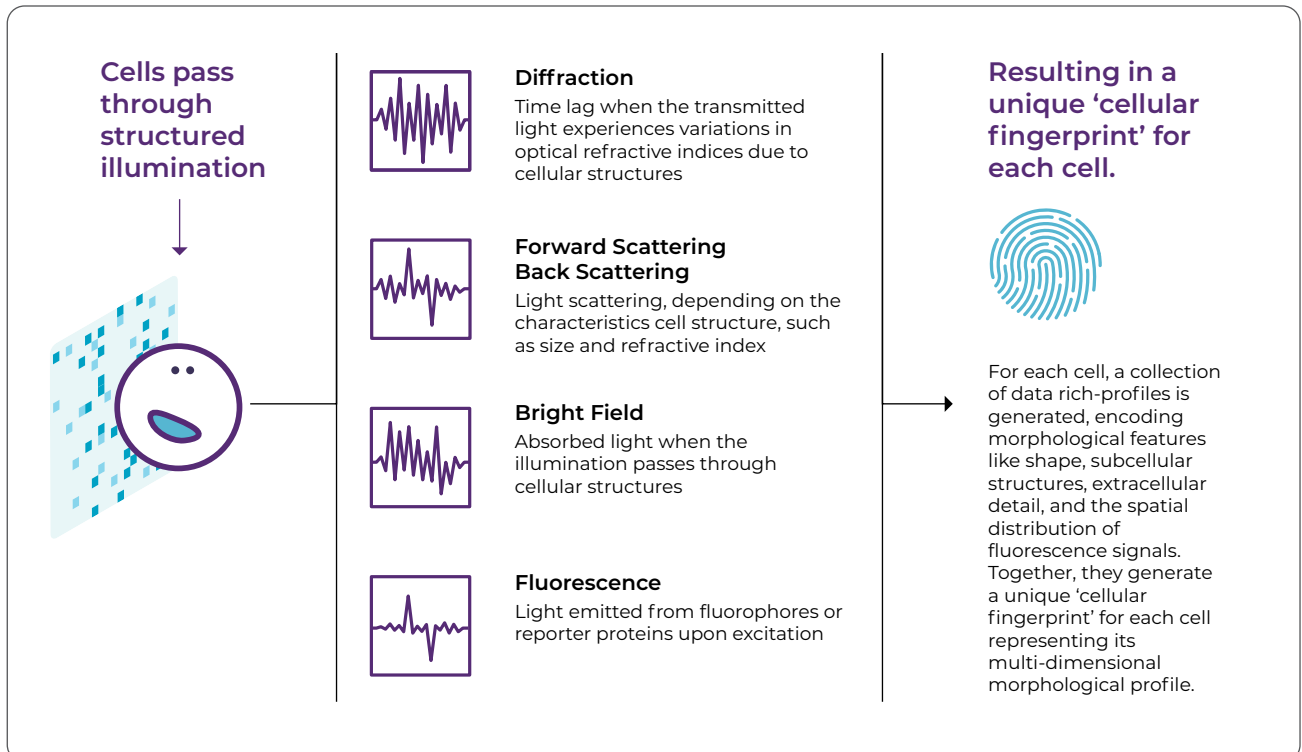
GHOST CYTOMETRY: Powering VisionSort Beyond Conventional Flow

Fueling VisionSort is Ghost Cytometry, a Science-published technology that enables label-free cell sorting based on cell morphology.

Unlike conventional flow cytometry, which provides only basic morphological detail on individual cells, Ghost Cytometry uses a structured illumination to generate high-dimensional views of cell morphology. These 'cellular fingerprints' provide deep morphological detail for individual cells and provide a readout of cell phenotypic states.



SEE YOUR CELLS IN A WHOLE NEW LIGHT

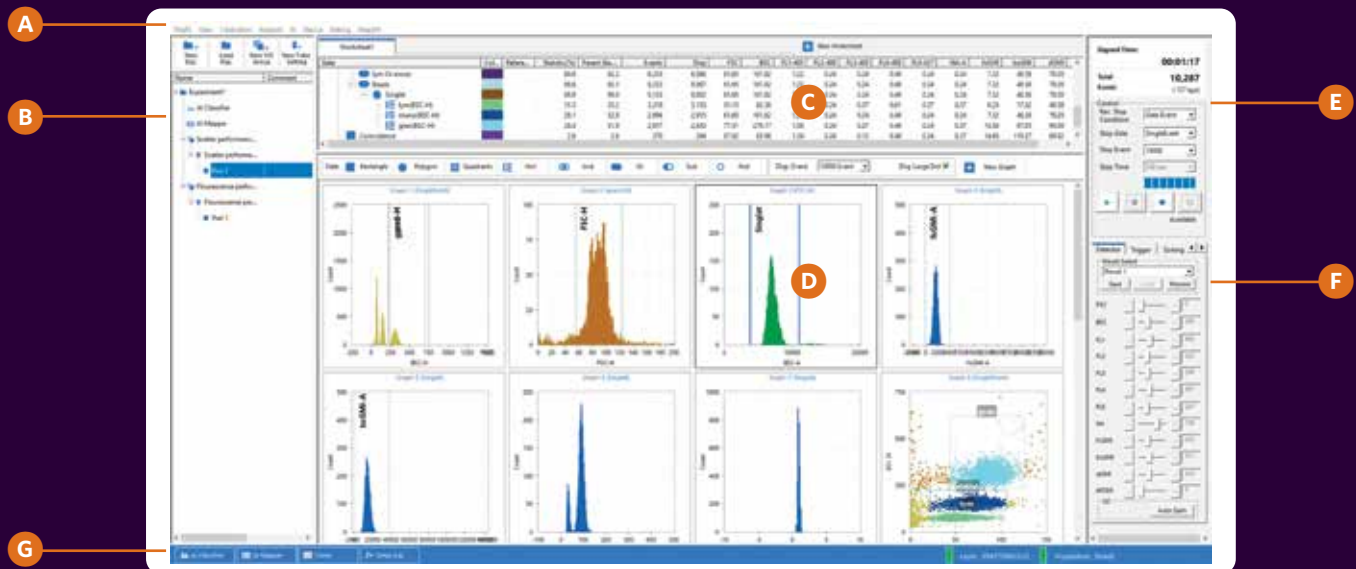


Familiar Flow Cytometry Software For Everyday Use

VisionSort software offers a user-friendly layout, and customizable panels both new and experienced and flow cytometry software users can embrace. With a user interface that is similar to conventional flow cytometry software, the software is easy to use and navigate. Complete with end-to-end workflow coverage, from calibration to shutdown and streamlined quality control (QC) steps, VisionSort software reduces the risk of errors and saves time.



Easily set up and customize experiments through a paneled UI.



- A. Common control ribbon** - List of frequently used commands
- B. Experiment management** - Easily create new experiments or import an existing template
- C. Gate design area** - Drag-and-drop design to make gating and population management easy
- D. Plot area** - Flexible and customizable to help you see desired results
- E. Flow control area** - Run data acquisition and set stop conditions
- F. Data acquisition setting** - Adjustable detector settings
- G. AI area** - Launch supervised or unsupervised machine learning

CELL THERAPY R&D

- Isolate T and NK cells with specific phenotypes, label free
- Identify CAR-T cell subsets with higher therapeutic potential

DRUG DISCOVERY

- Rapidly screen for a wider variety of molecular and complex cellular phenotypes
- Sort morphologically unique cancer cells for new target ID

DISEASE PROFILING

- Isolate morphologically distinct leukemic cells for biomarker discovery
- Discover morphological cell variants tied to drug resistance

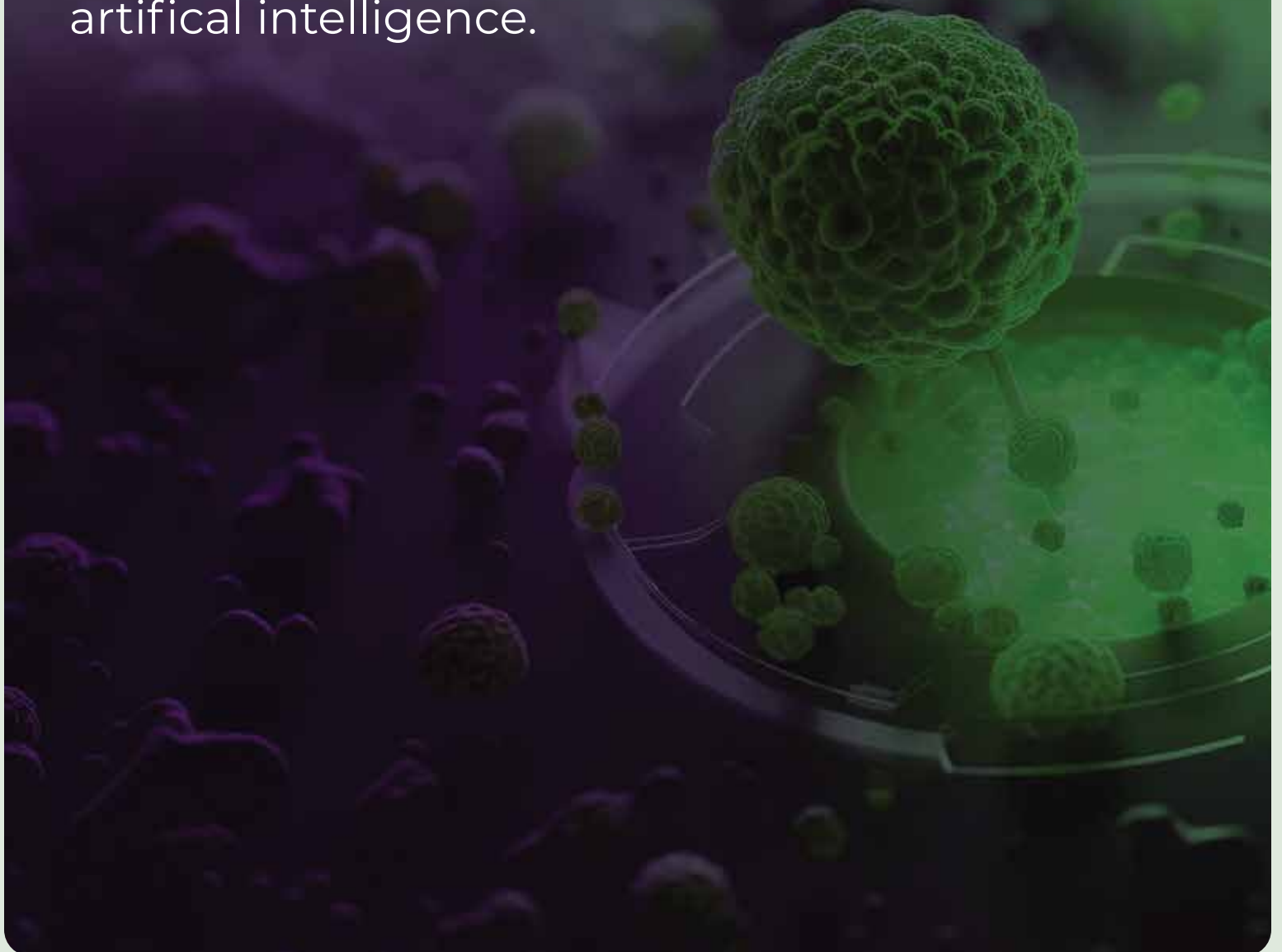
Discover a new world of downstream applications with **VisionSort**



VisionSort Applications

CELL THERAPY

Label-free, high throughput cell characterization and isolation based on high-resolution morphology and artificial intelligence.



Ditch the labels. Optimize cell therapy R&D with high-resolution morphological profiling and AI.

VisionSort expands the potential of your cell therapy R&D workflows with label-free cell sorting. Isolate immune cells of interest, select therapeutically meaningful cells, or monitor quality attributes for manufacturing QC... all without using external labels or markers.

CHALLENGE

VisionSort VALUES

Isolation
of therapeutic cells with minimal biological disruption

Label-free

Characterize & sort target cells without external labels



Selection
of therapeutic cells with specific phenotypes

Phenotypic Selection

Profile & isolate phenotypes important for developing quality cell therapy products.



Speed
of cytometry combined with the resolution of microscopy

High Throughput

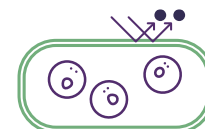
Analyze & sort cells at up to 3,000 eps



Maintenance
of viability, sterility & limiting contamination

Gentle Sorting + Closed System

Gentle, microfluidics-based cell monitoring & isolation performed in a closed, sterile system.



VisionSort Applications

DRUG DISCOVERY

Phenotypic screening
unleashed by morphology

Add a new dimension to your phenotypic screens with the exhaustive capacity of morphological profiling. Compatible with both small molecule screens and CRISPR-based approaches, VisionSort opens the door to screening a wider range of phenotypes.

Discover new drugs and drug targets quickly and more efficiently with VisionSort.

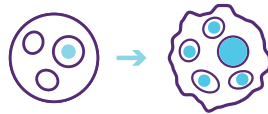


Identification of disease relevant phenotypes in phenotypic drug screening is critical. With VisionSort, unlock the potential to screen for a wider range of phenotypes including changes in protein localization, aggregation, or organelle localization. VisionSort's high-resolution profiling detects subtle morphological differences in cells and enables drug developers to find new candidates faster.



Flexible Screening

Diverse library compatibility, including CRISPR gRNAs, shRNAs, antibodies, peptides, & small molecule compounds.



Expanded range of screenable phenotypes

- Metabolic activity
- Cell differentiation
- Integrated stress response
- Epithelial-to-mesenchymal transition (EMT)
- And many more!

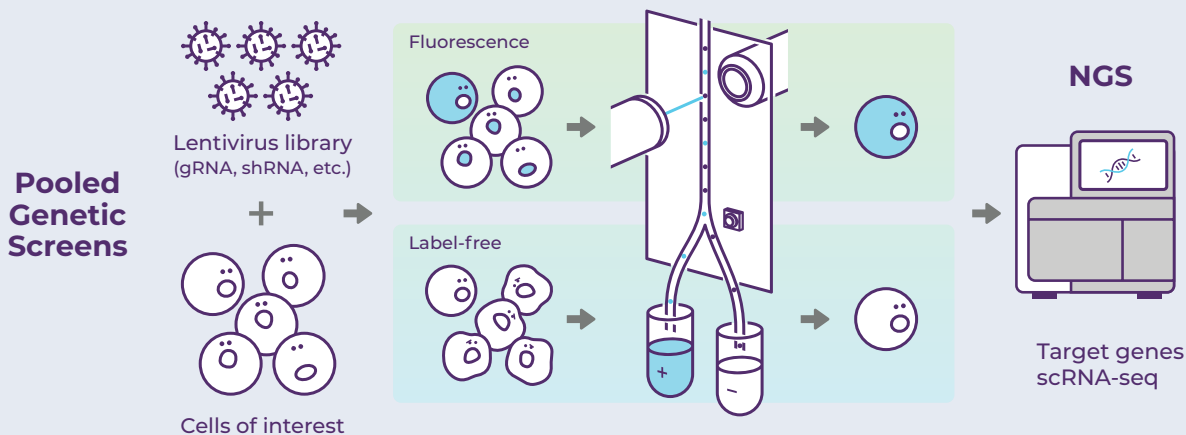


Time Savings

- No computational image processing
- Pathway-specific libraries: 1-3 h
- Whole genome libraries: 8-12 h
- Compound libraries (100k): 1-3 d

Flexible, Modern, & Efficient Screening Workflows

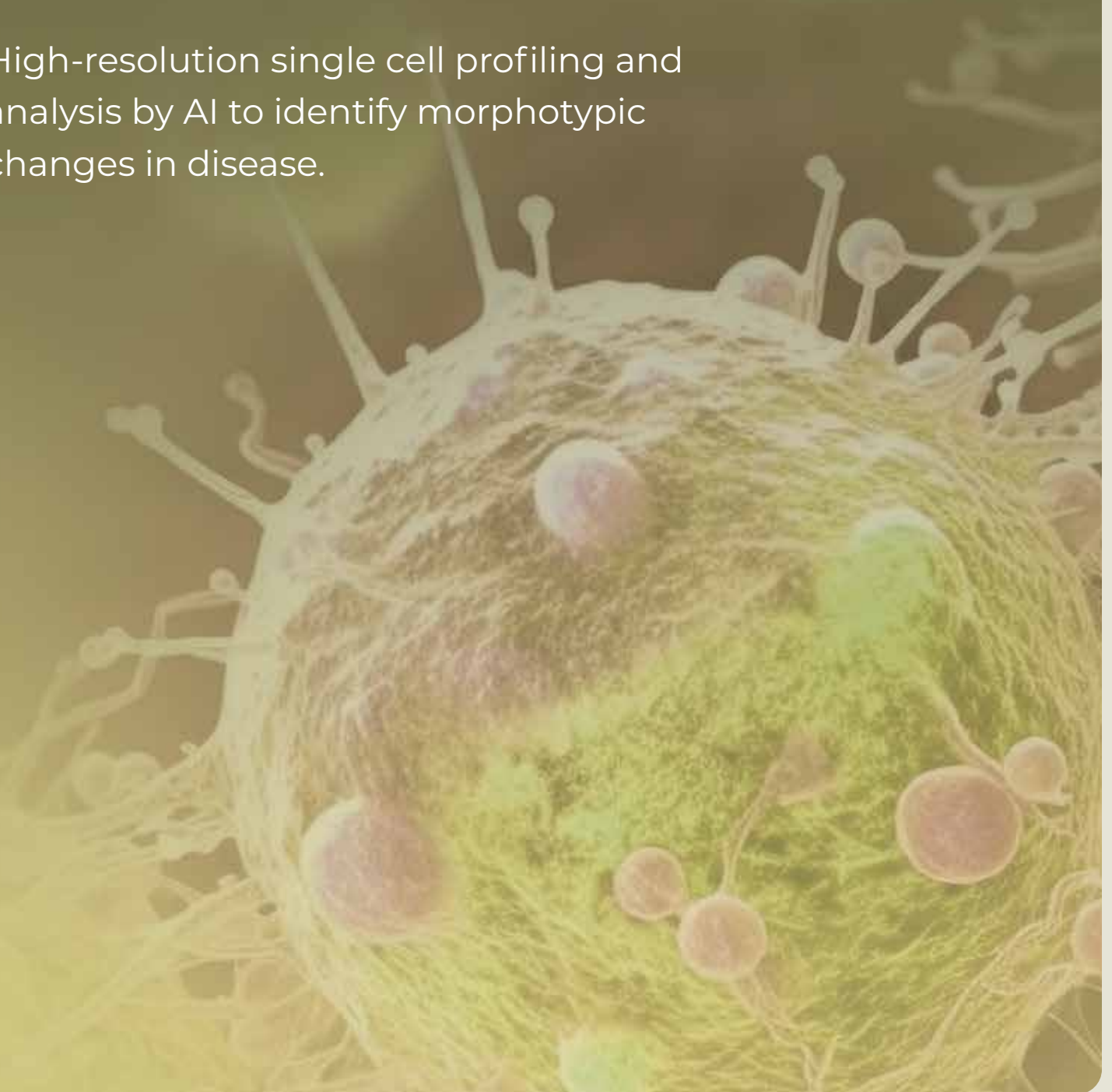
High-content drug screening with VisionSort can accelerate advance pooled screening and reduce costs. Supporting flexible workflows, VisionSort is driving the next generation of modern phenotypic drug discovery programs. Supporting both traditional small molecule screens and CRISPR-based genetic screens, VisionSort allows drug developers to directly link genotypes to phenotypes in any screen.



VisionSort Applications

DISEASE PROFILING

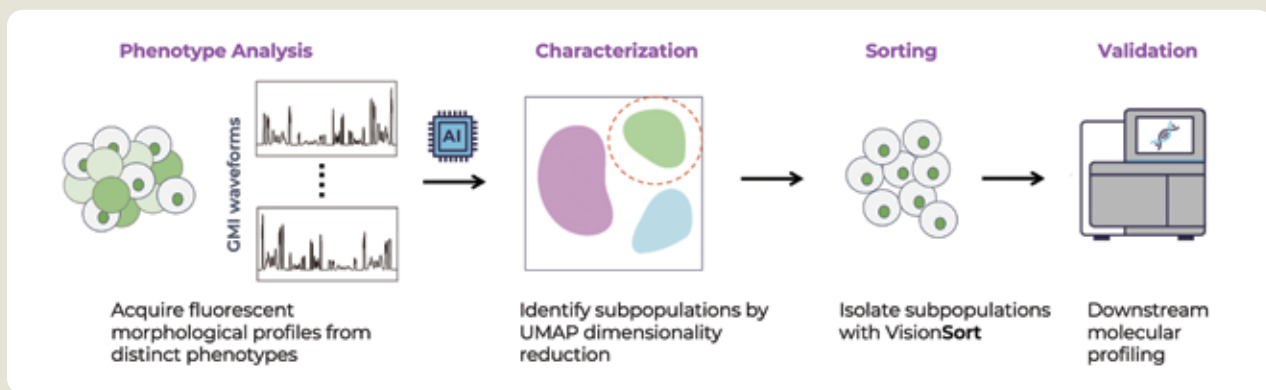
High-resolution single cell profiling and analysis by AI to identify morphotypic changes in disease.



Unlock the Hidden Diversity in Disease with AI

Achieve unparalleled new insight into disease with morphological profiling and AI. Uncover and isolate rare and unique cell populations, identify new drug targets and drug resistance mechanisms, or incorporate morphology into patient stratification models.

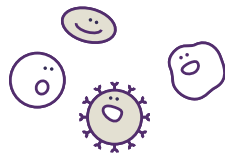
VisionSort elevates biomarker discovery campaigns to a new level with flexible, easy-to-use, and user-controlled AI algorithms embedded directly in the instrument. Discover more with unbiased morphometric characterization.



VisionSort for Disease Profiling

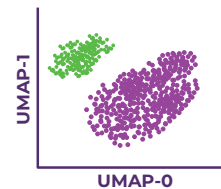
Phenotypic Diversity

Profiling & isolation of disease-relevant phenotypes.



Unbiased Analysis

Evaluate disease holistically, without the bias of labels or markers.



Novel Biological Insight

Directly link genotypes to phenotypes to gain deeper disease insight.



High Throughput

Analysis & sorting at 3,000 eps



AI-Driven Cell Classification and Sorting

With VisionSort, harness the power of AI in your cellular analysis and sorting workflows using both supervised and unsupervised machine learning approaches. Match the approach with your downstream R&D goals and experience ultimate control with powerful algorithms and visualization tools embedded directly in VisionSort.

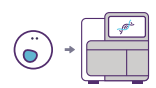
**Train
VisionSort**



**Sort
Your Cells**



**Use
Your Cells**

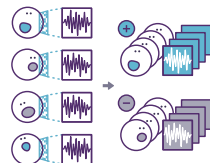


Two complementary approaches to get the cells you need!

Supervised Machine Learning

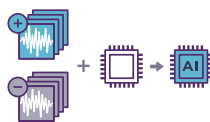
Labeling

Morphological profiles are paired with fluorescently labeled markers for cell classes of interest.



Modeling

A machine-learning model is developed.



In Silico Prediction

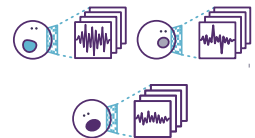
The machine-learning model predicts cell classes by evaluating morphological profiles in unlabeled samples.



Unsupervised Machine Learning

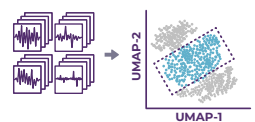
Profiling

Morphological profiles are generated for each cell by Ghost Cytometry



Dimensional Reduction

Morphological profiles are collapsed using dimensional reduction methods such as t-SNE and UMAP. Users create gates to identify potentially unique subpopulations.



Model Generation & Sorting

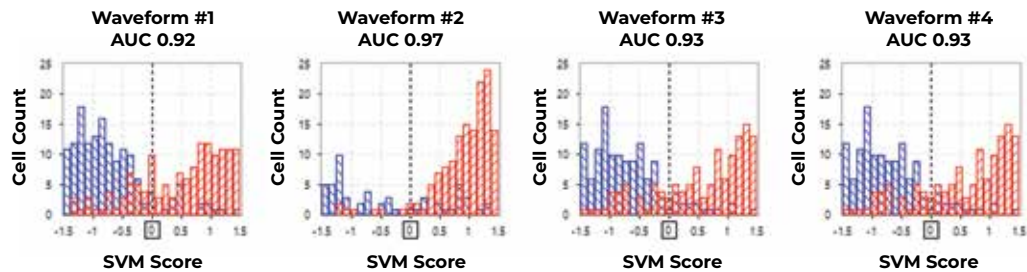
Classification models for subpopulations are created to enable real time live cell sorting.



Powerful New Visualizations and Sorting Tools At Your Fingertips

VisionSort contains powerful AI to analyze large datasets and provides researchers with unique insights to cell populations. From complex data sets, VisionSort generates population visualizations based on both fluorescence and morphometric data. AI-driven population analysis with VisionSort provides researchers with entirely new ways to isolate cells and extract novel hypotheses from both simple experiments and large datasets, making it an essential tool for any R&D lab.

Support Vector Machine (SVM) Classification



Cultured T cells



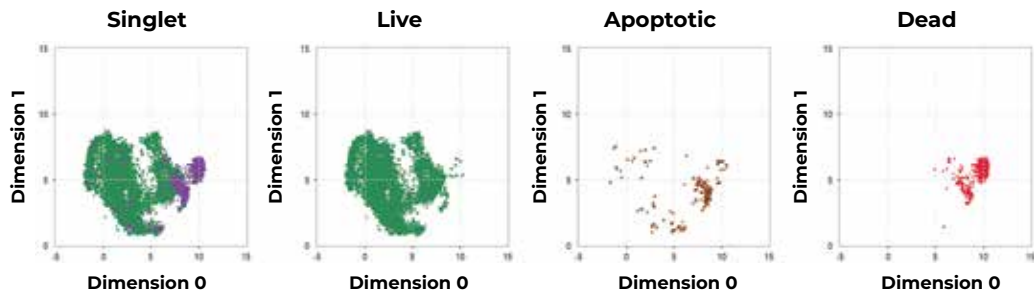
Induce Apoptosis



Supervised Machine Learning

Unsupervised Machine Learning

Uniform Manifold Approximation and Projection (UMAP) Classification



VisionSort Technical Specifications

SIZE AND WEIGHT	
Dimensions (W x D X H)	154 x 76 x 151 cm (60.6 x 29.9 x 59.5 in)
System Cabinet	92 x 76 x 151 cm (1.05 m ³) (36.2 x 29.9 x 59.5 in)
Control Cabinet	61 x 75 x 98 cm (0.45 m ³) (24.0 x 29.5 x 38.6 in)
Weight	431 kg (950 lbs.)
System Cabinet	328 kg (723 lbs.)
Control Cabinet	103 kg (227lbs.)
OPTICS	
Laser excitation	405 nm, 488 nm, 637 nm
Scatter detectors	FSC, BSC
Fluorescence detectors	Blue: 440/40 nm (405 nm excitation) Green: 525/50 nm (488 nm excitation) Yellow: 600/37 nm (488 nm excitation) Red: 680/42 nm (637 nm excitation) Infrared: 792/64 nm (637 nm excitation)
Ghost Motion Image (GMI) signal detectors	Forward scattered GMI signal (fsGMI) Backward scattered GMI signal (bsGMI) Brightfield GMI signal (bfGMI) Diffractive GMI signal (dGMI) Fluorescence GMI signal (405 nm excitation, 440 nm emission)
Objective lens	0.63 μ m (NA: 0.8)
FLUIDICS	
Sample input	5 mL round bottom tube and 15 mL conical tube
Sample collection	15 mL and 50 mL conical tubes
Minimum sample volume	100 μ L (when using 5 mL round bottom tube)
Dead volume	<50 μ L (when using 5 mL round bottom tube)
Temperature control	Temperature of inlet and outlet is software-adjustable: Cool to room temperature (~12 - 23 °C, 50 - 73 °F)
Fluidic reservoirs	10 L sheath 10 L waste 5 L deionized (DI) water
INSTALLATION	
Power requirements	100-120VAC 15 AMP Max. (220-240 VAC 10 AMP MAX for EU instruments)
Pressure supply requirements	700-820 kPa (100-120 psi)
Operating temperature	17-23 °C
Operating humidity	5-80% relative humidity, non-condensing

PERFORMANCE	
Fluorescence sensitivity	FITC: <1000 molecules of equivalent soluble fluorochrome (MESF-FITC)
Fluorescence resolution	< 5% (HPCV)
Purity and yield	Purity of >98% and yield >80% of Poisson's expected yield.*
Viability	>99% for lymphocytes
Detection rate	Up to 3,000 events per second
Cell flow rate	Up to 3,000 cells/s (1.1x10 ⁷ cells/h) 1.2 mL/h (Processing Rate)
Maximum operating pressure (Pressure applied to cells)	Up to 150 kPa (21 psi)
SORTING CARTRIDGE	
Material	PDMS (Dimethylpolysiloxane), Glass
Size	136 x 88 x 7.5 mm (5.4 x 3.5 x 0.3 in)
Channel dimension	32.5 x 50 µm
Maximum loading cell number	1 x 10 ⁷ cells/mL
Sorting mode	One-way (Positive / Other), Two-way viable cell collection
Cell Size	4 – 40 microns
SYSTEM & SOFTWARE	
Workstation CPU	Intel Core i9-10900TE
Operating system	Windows®10 IoT Enterprise LTSC
Signal Processing	14-bit analog-to-digital conversion and signal processing
Software	VisionSort Control Software
Data types	*.gcs (proprietary file type) Scatter Height, Width, and Area and conventional fluorescence can be exported to Flow Cytometry Standard (FCS) 3.1 file format (*.fcs)
USB port	2 x USB 3.0
Ethernet	1 Port
Monitor	2 x 27" LCDs, 1,920 x 1,080-pixel resolution
Memory	64 GB (DDR4)
Storage	240 GB SATA SSD; 8TB SATA SSD

Compatible Fluorophore Table

	Excitation (nm)	Detector (nm)	Example of fluorophores
Blue	405	440/40	DAPI, Hoechst 33342, AF405, BV421, Pacific Blue, V450, CellTracker Blue CMF2HC
Green	488	525/50	EGFP, FITC, AF488, CFSE, CellTracker Green CMFDA
Yellow	488	600/37	PE
Red	637	680/42	APC, AF647, CellTracker DeepRed
Infrared	637	785/62	APC-Cy7, Zombie NIR

Ordering Information

INSTRUMENT	
TCVS01	VisionSort (100-120 VAC, 15 Amp max)
TCVS02	VisionSort (220-240 VAC, 10 Amp max)
REAGENT AND CONSUMABLES	
TCK001	VisionSort Starter Kit
TCK002	VisionSort Calibration & Performance Bead Set
TCK003	Celluminate Kit
TCK004	VisionSort QC Kit
TCB-VB001-1	VisionBeads
TCB-VB001-2	VisionBeads
TCB-RBW001-1	VS P-RBW Beads
TCB-RBW001-2	VS P-RBW Beads
TCB-CB001-1	VS C-Beads
TCB-CB001-2	VS C-Beads
TCR-CN001-250	VS Clean
TCR-SS001-100	VS Suspension Solution
TCR-SH001-250	VS Sheath
TCC-TU001-50	50ml Tubes
TCC-TU001-15	15ml Tubes
TCC-CPW001-1	VS Wash Cartridge
TCC-CPS001-1	VS Sort Cartridge (1 Pack)
TCC-CPS001-10	VS Sort Cartridge (10 Pack)
TCT-CLB001-1	Celluminate Blue
TCT-CLG001-1	Celluminate Green
SERVICE PLAN	
300-001	ThinkCyte VisionSort Silver Service Plan Includes 1 year standard warranty: Parts*, labor and travel.
300-002	ThinkCyte VisionSort Gold Service Plan Includes 1 year standard warranty: Parts*, labor and travel with 1 Preventative Maintenance plan
300-003	ThinkCyte VisionSort Platinum Service Plan Includes 1 year standard warranty: Parts*, labor and travel. with 2 PM and 1 week of advanced VIP training
TRAINING PROGRAM	
300-004	ThinkCyte Advanced VIP Training (excludes travel and accommodation) 1 week training at ThinkCyte with Applications Expert Scientists

*Does not include lasers and FPGA





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LEARN MORE AT

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POWERED BY GHOST CYTOMETRY™