AKOYA
BIOSCIENCES®
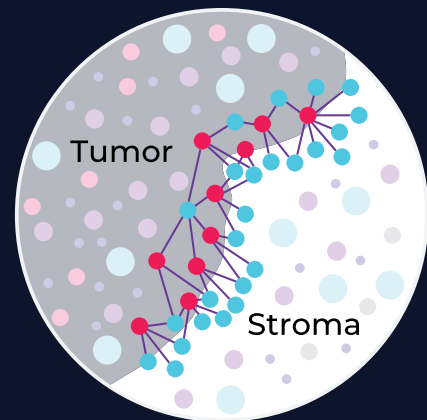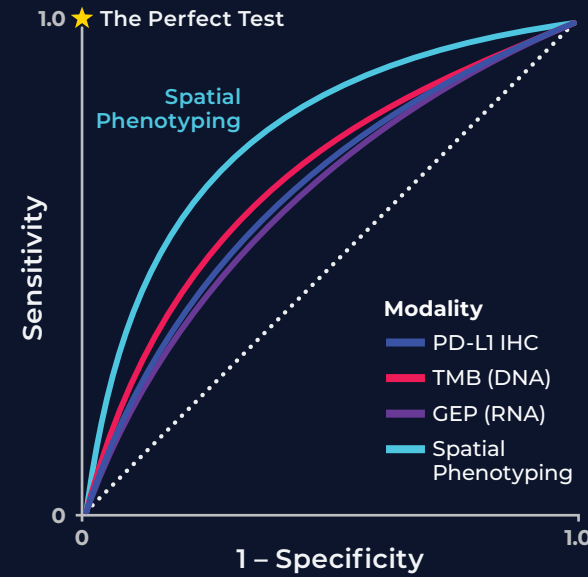THE SPATIAL BIOLOGY COMPANY®

THE PHENOIMAGER SOLUTION
Spatial Signatures at Scale

ADVANCING PRECISION MEDICINE WITH NOVEL BIOMARKERS

Setting a New Standard for Predictive Value

Immunotherapy treatments have shown unprecedented rates of durable responses in some of the most difficult-to-treat cancers; however, many patients do not respond to treatment.

A recent meta-analysis of more than 8000 samples, published in *JAMA Oncology*[1], showed that **spatial phenotyping, enabled by multiplex immunofluorescence (mIF), more accurately predicts patient response** to anti-PD-1/PD-L1 therapy than other biomarker assays including PD-L1 IHC, tumor mutational burden (TMB), and gene expression profiling (GEP).

Sensitivity vs 1 – Specificity

The Perfect Test

Spatial Phenotyping

Modality
- PD-L1 IHC
- TMB (DNA)
- GEP (RNA)
- Spatial Phenotyping

Spatial Phenotypic Signatures: A Novel Biomarker Class

Spatial Phenotypic Signatures measure the interactions and cell densities of tumor and immune cells in the tumor microenvironment (TME). The resulting cell-by-cell maps of the TME provide deeper insights into the tumor-immune biology, that could inform treatment response.

Tumor

Stroma

● Tumor cells ● Immune cells

1. Lu S, et. al., JAMA Oncol. 2019, 5(8):1195-1204

THE PHENOIMAGER SOLUTION
Measure Spatial Phenotypic Signatures, at Scale
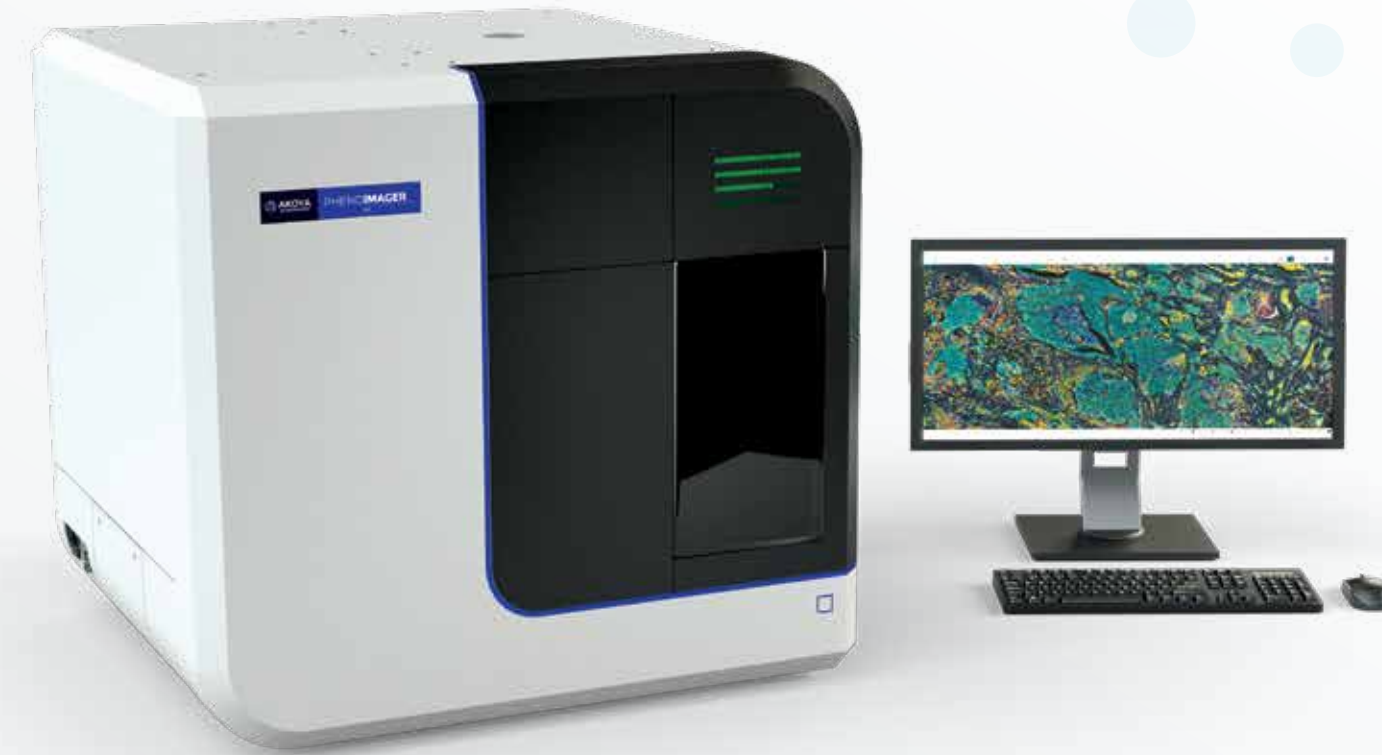
FAST
Rapid whole-slide scans in less than 20 minutes

ACCURATE
Proprietary Multispectral Imaging (MSI) technology* enables quantitative and accurate phenotyping

INTEGRATED
Comprehensive multiplex imaging solution optimized from sample to result

EFFICIENT
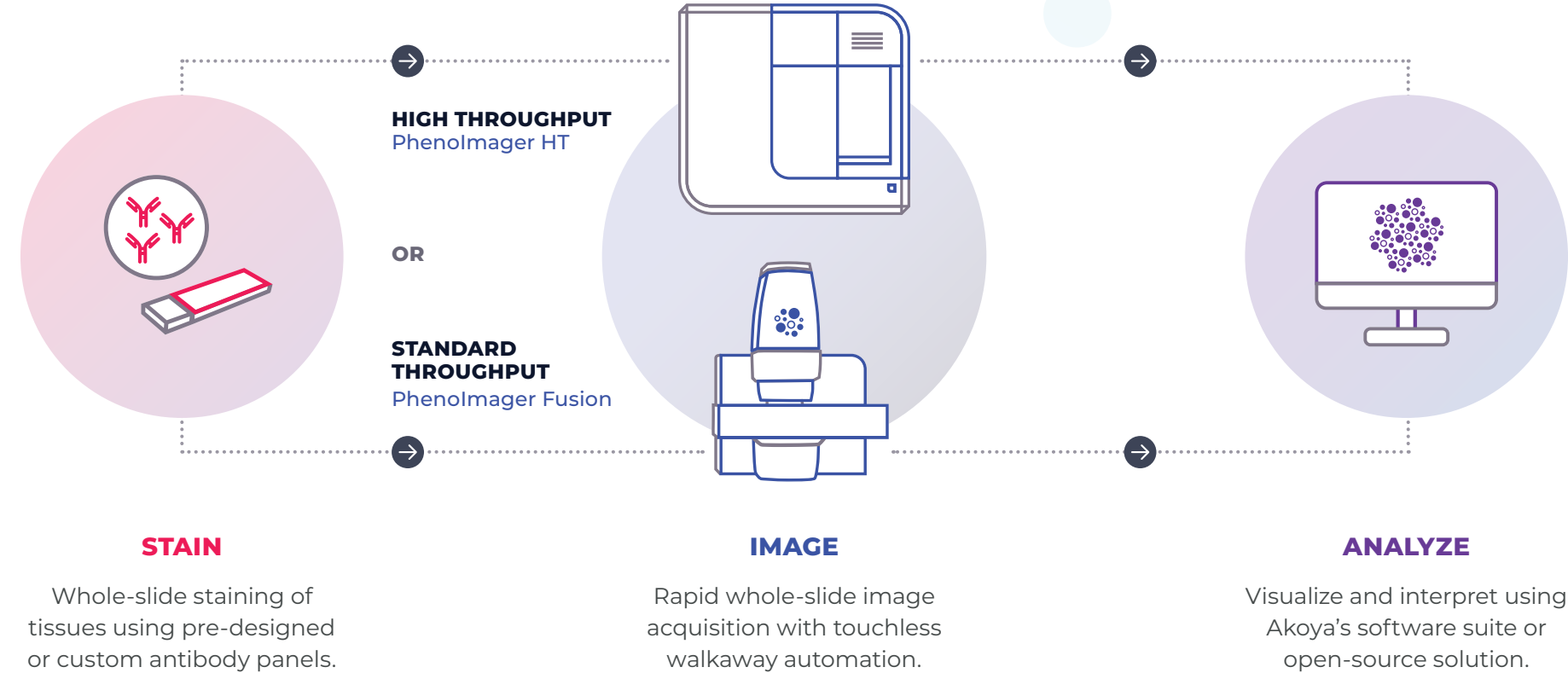Save precious samples by detecting multiple biomarkers in a single section

*Patent pending

Proven technology with over 400 peer-reviewed publications

AN INTEGRATED END-TO-END SOLUTION

PhenoImager Workflow

The discovery and validation of Spatial Phenotypic Signatures requires a solution that easily integrates staining, imaging, and analysis using existing workflows while providing accuracy and reproducibility.

HIGH THROUGHPUT
PhenoImager HT

OR

STANDARD THROUGHPUT
PhenoImager Fusion

STAIN

Whole-slide staining of tissues using pre-designed or custom antibody panels.

IMAGE

Rapid whole-slide image acquisition with touchless walkaway automation.

ANALYZE

Visualize and interpret using Akoya's software suite or open-source solution.

SHIFTING THE PARADIGM: VISUAL IHC TO QUANTITATIVE SPATIAL PHENOTYPING

Akoya's Opal™ reagents are optimized for reliable Multispectral Imaging (MSI) making multiplex results accessible to anyone who works with standard IHC in formalin-fixed, paraffin-embedded (FFPE) tissue.

Opal's Tyramide Signal Amplification (TSA)-based detection provides:

- ✓ Up to 8 markers on a single tissue – manual or automation
- ✓ Improved sensitivity (10 to 100-fold)*
- ✓ Higher dynamic range up to 4 logs*
- ✓ Reduced reagent consumption

*Compared to chromogenic IHC

Customizable Multiplex Kits

Pre-designed Ready-to-Use Panels

Staining Reagents

⤓ DOWNLOAD TECH NOTE AT: **akoyabio.com/opal-panels**

WHOLE-SLIDE SCANNING REVEALS COMPLEX BIOLOGY IN MINUTES

The PhenoImager Fusion and HT instruments are the fastest quantitative imaging platforms enabling 6-plex whole-slide scans in less than 20 minutes. Powered by proprietary MSI technology, the PhenoImager instruments provide rapid and accurate spatial phenotyping, at scale.
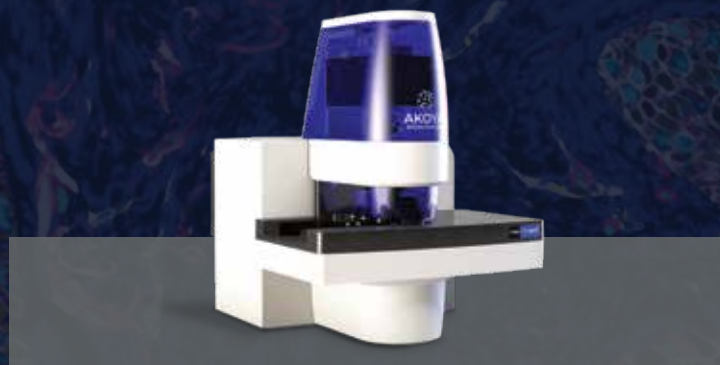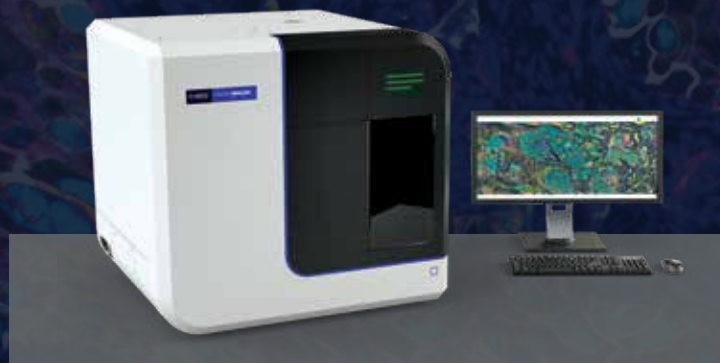
PhenoImager™ Fusion
Spatial Signatures within Reach

STANDARD THROUGHPUT
4 slides per run, 100+ slides per week

FLEXIBLE
Integrates with PhenoCycler™ for ultrahigh-plex imaging (100+ biomarkers)

PhenoImager™ HT
Spatial Signatures at Scale

ULTRA HIGH THROUGHPUT
80+ slides per run, 300+ slides per week with continuous loading

AUTOMATED
Touchless automation technology

SEE THE DATA AT: **akoyabio.com/accurateMSI**

DATA ACCURACY WITH HIGHER PLEXING

Akoya's Proprietary Multispectral Imaging (MSI) Technology

Conventional imaging systems utilize narrow bandpass filters that capture only a snapshot (typically the peak) of each fluorophore's emission spectrum. Accurate analysis is often complicated with issues such as tissue autofluorescence and spectral overlap.
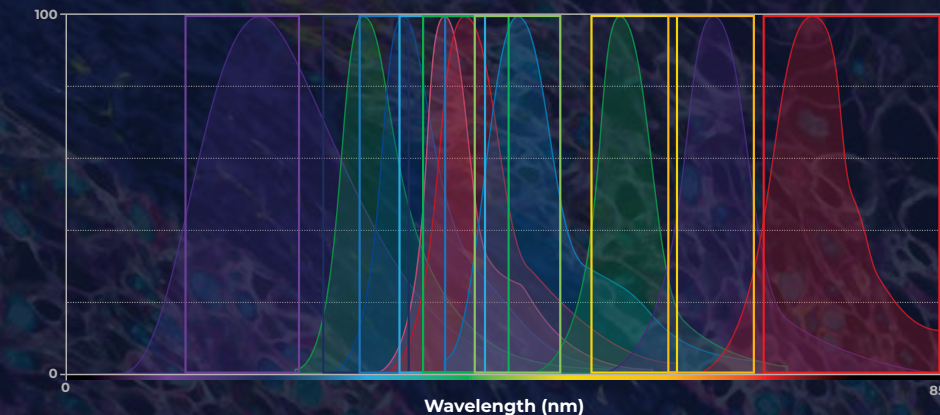
Figure on the right shows fluorophore emission spectra with representative examples of bandpass filters (colored boxes).

Rather than using only a small portion of each fluorophore's emission spectrum, Akoya's MSI Technology* allows users to gather the entire emission signature to achieve robust spectral unmixing. This makes each fluorophore's signal truly distinct from those of other fluorophores and enables the clear separation of signals, as well as the removal of autofluorescence.

| Raw Image | Autofluorescence | Unmixed Image |
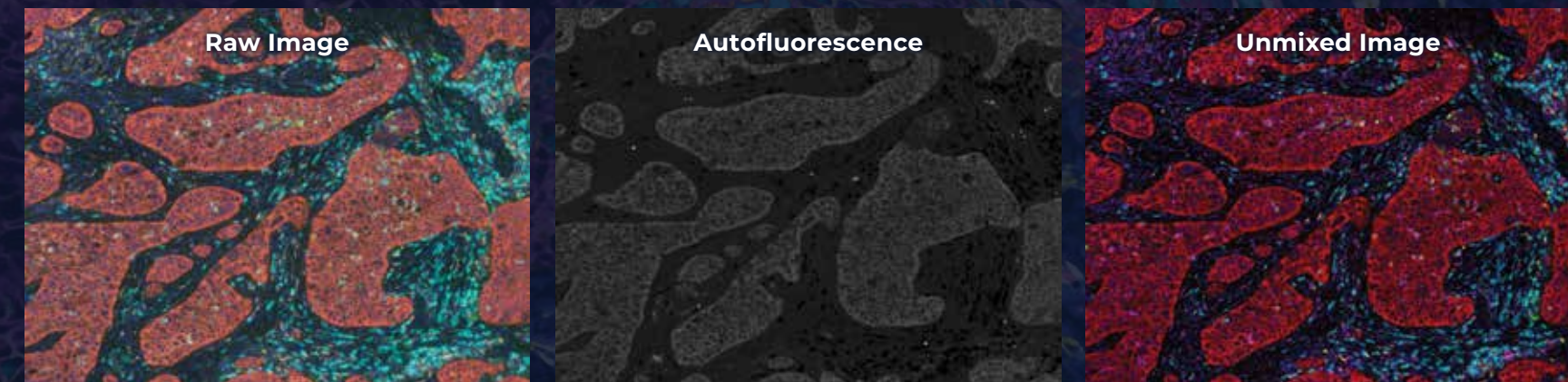
Akoya's MSI technology applied to stained fluorescent images can isolate autofluorescence, increasing accuracy of phenotyping up to 50%. Images: Lung Cancer stained with a 6-plex Panel (DAPI, CD8, PD-L1, FoxP3, PD-1, panCK, CD68)
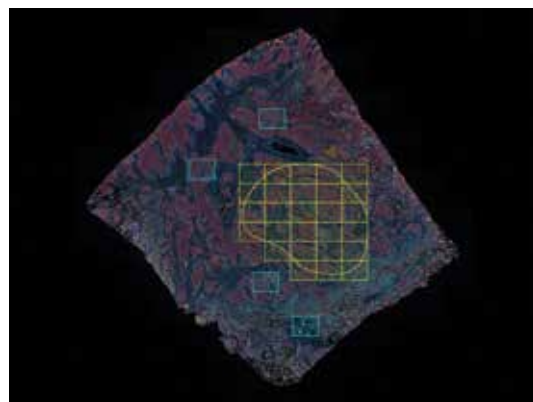
*Patent pending

FAST, ACCURATE DATA GENERATION

From Images to Phenotypes to Signatures

Akoya's biomarker discovery tools combine the latest technologies with algorithms and intuitive, easy-to-use interfaces, giving you the power to make new, exciting discoveries from your data.

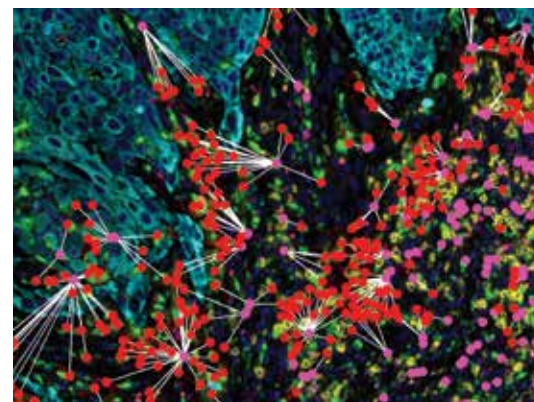### The PhenoImager Advanced Tissue Image Analysis Software Suite

Phenochart™

Whole-slide contextual viewer enabling viewing and annotation
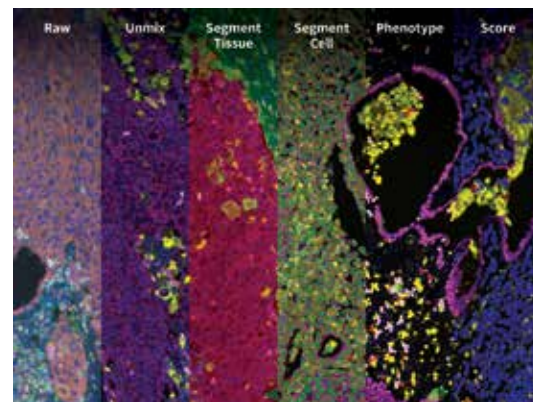
inForm®

Patented automated tissue analysis software for spectral unmixing, segmentation, and phenotyping

phenoptrReports

Powerful analytical tool to analyze spatial relationships

DOWNLOAD TECH NOTE AT: **akoyabio.com/advanced-analysis**

SPATIAL SIGNATURE STANDARDIZATION

CASE STUDY
The First Multi-Institutional Analytical Demonstration of a Spatial Biology Workflow

The MITRE Study established the high reproducibility and robustness of Akoya Biosciences' PhenoImager platform for spatial phenotyping in clinical and translational research.

Correlation across sites
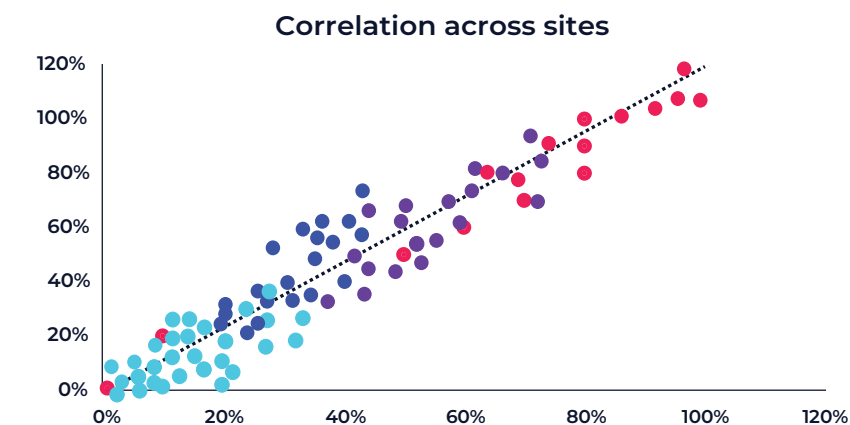
LEARN ABOUT WORKFLOW VALIDATION: **akoyabio.com/mitre-validation**

CASE STUDY
Astronomy Meets Pathology for Immunotherapy Research

Investigators at Johns Hopkins University (JHU) took a novel approach to developing spatial phenotypic signatures for accurate prediction of immunotherapy response, combining sky mapping algorithms with Akoya's cutting-edge PhenoImager platform.

LEARN HOW TO DEVELOP A SPATIAL SIGNATURE: **akoyabio.com/astropath-signature**

DISCOVER

TRANSLATE

IMPLEMENT

CASE STUDY

Spatial Analysis of Cellular Neighborhoods

In a pioneering study utilizing the PhenoCycler system, Dr. Garry Nolan's lab at Stanford University developed a novel analysis framework to study tissue biology at two levels– the distinct regions of the tissue and the cell types present in these regions.

SEE THE FULL STUDY:
akoyabio.com/cellular-neighborhoods

The PhenoCycler™-Fusion Solution
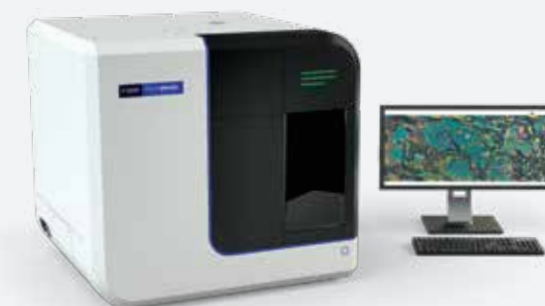*Spatial Discovery at Scale*

Rapid whole-slide imaging of 100+ biomarkers
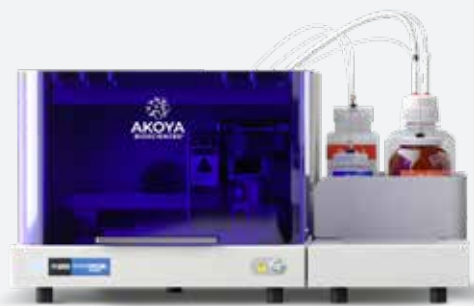
UNBIASED

FAST

PROVEN

Translate your discoveries into actionable spatial phenotypic signatures with our connected ecosystem of solutions

The PhenoImager Solution
Spatial Signatures at Scale

Rapid whole-slide imaging of 6 biomarkers, 300+ slides per week

 # OF MARKERS PER RUN

 # OF SAMPLES PER DAY

MULTISPECTRAL IMAGING FOR EVERY LAB

	PhenoImager™ Fusion	PhenoImager™ HT
Dimensions (W × D × H in)	25" × 20" × 26"	30" × 28" × 28"
Weight*	~120 lbs./54.4 kg	~187 lbs./85 kg
Tissue Format	Whole-slide, Tissue Microarray and Tissue Sections	Whole-slide, Tissue Microarray and Tissue Sections
Detection Method	Fluorescence, Brightfield	Fluorescence, Brightfield
Light Source	LED	LED
Multispectral Range	440 nm – 780 nm	440 nm – 780 nm
Speed (1.5cm X 1.5cm)	Fluorescence: 18 min; Brightfield: 9 min	Fluorescence: 12 min; Brightfield: 6 min
Throughput	4 slide	80 slide (with continuous loading technology)
Multiplexing Capability	Separates up to 7 colors	Separates up to 9 colors, even if overlapping
Resolution	10X (1.0 μm/pixel), 20X (0.5 μm/pixel) or 40X (0.25 μm/pixel)	10X (1.0 μm/pixel), 20X (0.5 μm/pixel) or 40X (0.25 μm/pixel)
Image Analysis Software	inForm® and phenoptrReports	inForm® and phenoptrReports
File Format	Akoya Biosciences' whole-slide scan image (.QPTIFF)	Akoya Biosciences' whole-slide scan image (.QPTIFF), LCTF enabled; Multispectral images (.im3), color images (.JPEG, .BMP, .PNG)
Automation	Touchless, with walk-away image acquisition	Touchless, with walk-away image acquisition
Power Requirements	100-240VAC, 50/60 Hz	100-240VAC, 50/60 Hz

*Measurements are approximations and could vary slightly for the final shipments

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