Element Biosciences

Specification Sheet

Element AVITI24™ System

Single cell multiomics and next-generation sequencing on a single platform with unmatched performance and limitless possibilities

Highlights

- Analyze RNA, protein, and morphology in a single sample
- Profile up to 2 M cells in 24 hours on dual flow cells
- Capture transcripts and proteins with sensitivity and specificity
- Prepare cell samples in 45 minutes hands-on time

Introduction

The AVITI24 System with Teton™ CytoProfiling simultaneously measures a diverse array of molecular features in up to 1 million cells per flow cell for deep multiomic profiling of adherent cells or cell suspensions. From a single sample, you can analyze RNA, proteins, and cell morphology in 24 hours. On the same system, the AVITI24 delivers high-quality next-generation sequencing (NGS) data with uncompromising performance, flexibility, and affordability, and access to a range of assays from whole-genome sequencing to targeted panels.

Multiomics unleashed by ABC

Avidite base chemistry (ABC), the AVITI breakthrough optical design, image processing algorithms, and flexible surface chemistries, enable high-plexity multiomic analysis directly in intact cells fixed and permeabilized onto the Teton flow cell surface. Teton chemistries for RNA, protein, and cell paint analysis use probe or antibody-mediated detection schemes coupled with ABC sequencing to measure RNA and protein expression at subcellular resolution in individual cells. Proprietary cell paint profiling provides visualization of the cell membrane, nucleus, and mitochondria, as well as other cell organelles.

Cell segmentation is performed using cell membrane and nuclear markers coupled with machine learning models validated on diverse cell types, ensuring accurate transcript and protein assignment to the correct cell.

The AVITI24 can detect thousands of transcripts per cell and billions of high-quality transcripts in situ on one Teton flow cell for sensitive detection of genes across a range of expression levels, fueling high-resolution cell typing and pathway analysis.

Figure 1. AVITI24 unites the diverse worlds of molecular biology and cell imaging on one compact benchtop system.

Industry-leading throughput

The AVITI24 technology is designed with throughput in mind to enable more cells, more samples, and more experiments to empower researchers to drive transformative discoveries without constraints.

With an imaging area of 10 cm² and dual flow cell architecture, the AVITI24 is capable of profiling up to 2 million cells per run, scaling the number of samples, conditions, or perturbations possible in a single 24-hour run.

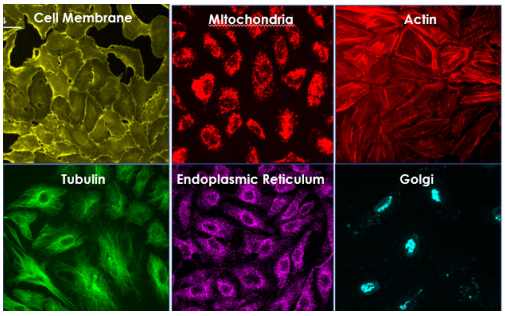

Figure 2. Cell paint images on AVITI24 using ABC sequencing readout.

The total off-instrument workflow requires 45 minutes of hands-on time to wash, fix, and permeabilize cells and assemble the flow cell. Teton introduces the unique ability to automatically perform probe hybridization or antibody binding, amplification, and sequencing directly onboard the instrument.

Cell paint, RNA, and protein detection is enabled by direct

sequencing of AVITI barcodes, which obviates the need for time-consuming decoding steps.

The AVITI24 software suite also includes real-time, onboard cell segmentation, cell assignment, and morphology reporting to accelerate downstream data analysis. Together, these innovations reduce the total time from sample to analysis to under 24 hours.

Broad sample compatibility

Teton flow cells are available as either ready-to-use PLL-coated flow cells or uncoated customizable flow cells to support a broad range of cell types and culture conditions. The AVITI24 launches with two fixed Teton 350-plex RNA and 50-plex protein panels for humans focused on deep profiling of the MAPK signaling pathway for cell cycle and apoptosis regulation. The expanding AVITI24 roadmap includes additional fixed and custom panels with expanded plexity, as well as direct in situ sequencing for targeted or untargeted transcriptome analysis to accelerate discovery power.

Summary

The AVITI24 seamlessly integrates state-of-the-art sequencing with Teton CytoProfiling in one integrated biology platform. From deciphering cellular development to uncovering drug resistance mechanisms, AVITI24 expands scientific possibilities by harnessing the power of cell imaging and multiomics in one instrument.

With a streamlined workflow and industry-leading runtime, the AVITI24 accelerates the pace of scientific discovery and reimagines what is possible from a single benchtop system.

Sequencing specifications

Read Count[a]	High output: Medium output: Low output:	1 B reads per flow cell 500 M reads per flow cell 250 M reads per flow cell
Accuracy	> 90% Q30 with 2 x 150 and 2 x 75 cycles > 85% Q30 with 2 x 300 cycles > 70% Q50 with Cloudbreak UltraQ™ kits[c]	
Inputs	Direct loading of linear libraries with Cloudbreak Freestyle™ kits	
Run Time[b]	≤ 24 hours 2 x 75 cycles ≤ 38 hours 2 x 150 cycles ≤ 60 hours 2 x 300 cycles	

[a] Performance metrics are based on sequencing Element libraries. Actual results might differ due to library type and preparation methods.
[b] Individually addressable lanes and custom recipes can extend run times.
[c] Based on Elevate™ libraries and specific run parameters.

Cytoprofiling specifications

The following specifications are preliminary. Final specifications are subject to change.

Analytes	RNA, protein, morphology 100 bp in situ RNA sequencing in 2025
Plex	RNA: 350 targets Protein: 50 targets Morphology: 6 markers
Content	MAP Kinase Cell Cycle and Apoptosis Immunology, neuroscience, and custom panels in 2025
Imaging	< 250 nm subcellular spatial resolution with multi-feature cell segmentation
Inputs	Adherent cells Cell suspensions in 2025
Transcripts	3000 mean transcripts detected per cell
Throughput	Up to 1 M cells with 10 cm^2 area per flow cell Two flow cells per run
Format	12 wells (0.5 cm^2/well) 1 well (10 cm^2/well)
Run Time	24 hours
Sample Prep	45 minutes

System specifications

Instrument Configuration	Dual flow cells AVITI Operating Software Ubuntu Core 20.04 LTS operating system
Operating Environment	Temperature: 18°C to 26°C Elevation: < 2000 m Sound level: ≤ 62 db at 3.3 ft
Instrument Dimensions	(H x W x D) 29.5 in x 37.6 in x 28.5 in Weight: 155.1 kg/342 lb
Power Requirements	100–240 VAC at 50/60 Hz 15 A, 550 W (average)

Ordering information

Element AVITI24 System	880-00004
Element AVITI24 Upgrade	895-00060

To learn more, visit elementbiosciences.com

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