Avidion

True binding. Better therapies.

Ideal for cell therapy candidate screening and large characterization studies. Run up to 192 measurements with minimal hands-on time.

lumicks.com/**avidion**

Product brochure

See more.
Know more.

We empower the academic and pharmaceutical communities with cutting-edge technologies to deeply understand the mechanisms of life and disease, driving the discovery and development of life-saving therapies.

17.5

Average **impact factor** of publications including Cell Avidity measurements

>70

Research institutes and biotech/pharma companies **working with Cell Avidity** technology

>220

Total instruments installed by LUMICKS across the globe

>230

Publications that include measurements with LUMICKS technology

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The challenge

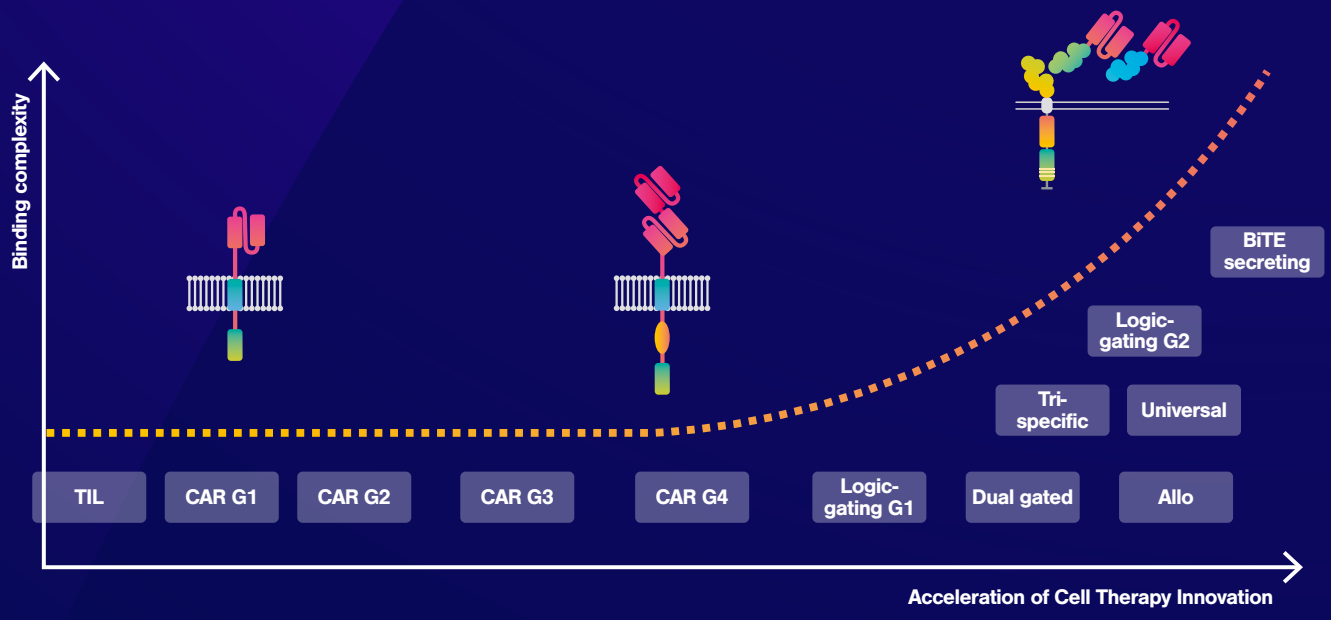
There are no simple answers to immuno-oncology's greatest challenges

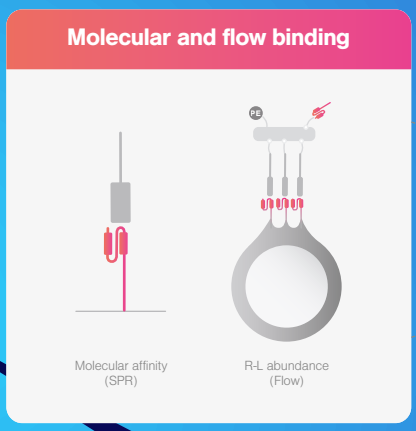
Many immunotherapies adapt to solve the field's most pressing issues (an intricate balance between persistence, potency, and safety) by integrating multiple signaling mechanisms and engaging with more than one target in parallel. With that trend, the binding mechanisms between binder and target also significantly increase in complexity.

Yet, most binding assays haven't kept up.

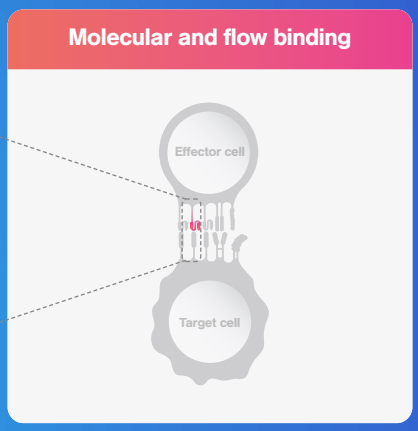
- Molecular assays like tetramer binding and surface plasmon resonance (SPR) offer simplified snapshots. Focusing on isolated ligand-receptor interactions or abundance on a molecular level, they can miss the cellular context and often do not correlate well with functional outcomes.
- Functional assays such as cytotoxicity and activation assays generally measure the outcome of binding yet may fail to provide direct mechanistic insights inhibiting rationally driven design choices.

This creates a gap between what we can measure and what we need to understand to advance next-generation immunotherapies.

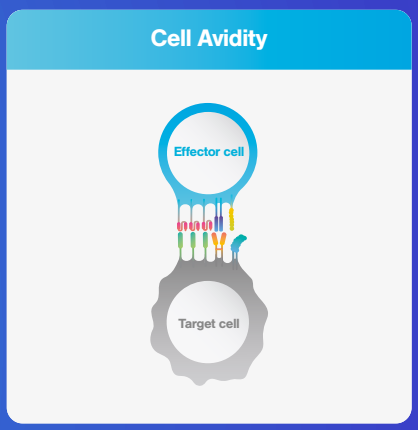




Molecular binding assays measure preconditions for binding...



... providing limited insights into actual cell binding.



While Cell Avidity captures the full complexity of cell binding.

Introducing Cell Avidity

By quantifying the strength of cell-cell or molecule-cell binding under controlled force conditions, Cell Avidity offers a direct, physiologically relevant measurement of binding in its full complexity.

Applied to cell therapies (CAR-T / TCR-T / NK), cell engagers and antibodies, Cell Avidity is shown to reveal the mechanisms of action, facilitating rational design choices, selecting the right candidates fast and early, and ultimately improving therapeutic outcomes.

To design smarter immunotherapies, we need to measure binding the way it happens—in real life, in real cells. This is Cell Avidity.

Unlock faster R&D cycles

Early in the pipeline - Select the right candidates fast

Quickly rank hundreds to thousands of therapeutic candidates to get insights into sensitivity and safety. Incorporate Cell Avidity early in the discovery workflow helps ensure that only candidates with the most promising binding characteristics progress.

Late-stage - Deep candidate characterization to drive clinical selection

Carry out deep functional characterization of select final candidates. Reveal differences in binding dynamics and target engagement to confidently select the optimal therapeutics for clinical development.

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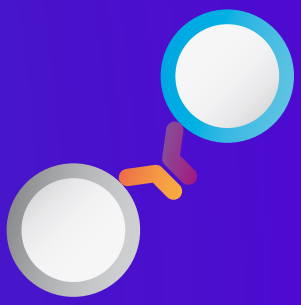
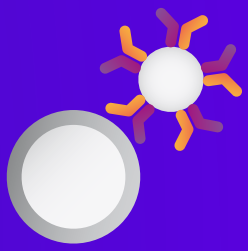
Cell Therapy

CAR-T, TCR T, NK, etc.



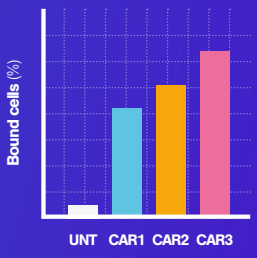
Cell Engagers

Bispecific, trispecific, etc.



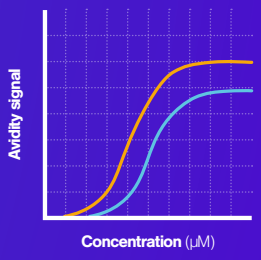
Antibody Therapy

Mono/multi-specific, nanobodies, etc.



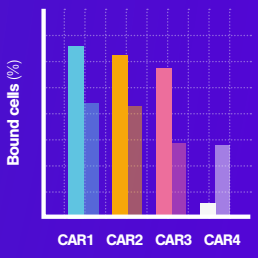
Binding potency

Avidity ranking & cell characterization



Binding sensitivity

Titration assay for CE / Peptide / Ab



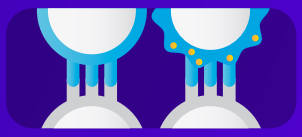
Binding specificity

Monolayer safety screening

Binder screening and optimization

Optimize binding to overcome exhaustion, improve potency, minimize OTOT and refine sensitivity to overcome immune escape.

Understand the impact of different antibody formats and fine-tune Cell Avidity to select candidates based on multi-domain binding measured in a single assay.



Effector functional modification

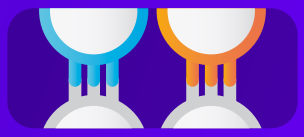
Measure how functional modifications in effector cells impact binding. Intracellularly driven differences in Cell Avidity can inform on potency and persistence.

Reveal the mechanism of action in therapy designs that change signaling sensitivity, activate cytokine or chemokine receptors, or reduce checkpoint receptors.

Tumor microenvironment response

Measure the tumor microenvironment's impact on binding by measuring Cell Avidity in the presence of tumor or TME modifying compounds.

Get insights into immune trafficking, effects of environment-modulating compounds, hypoxia effects and more.



Donor selection and quality control

Measure the combined effect of donor/host interactome or assess the combined effect of cell fitness, receptor expression, and population purity.

Quantify the degree of (mis)matching between donor and host or assess product quality across multiple key product attributes.

LUMXCKS

Avidion

The next generation Cell Avidity platform

Ideal for cell therapy candidate screening and large characterization studies. Run up to 4 disposable 48-well cartridges a day for a total of 192 measurements with <80 min. hands-on time.

High throughput

High-throughput measurements with 96-well plate compatibility

Hands-off

Minimal hands-on time through automated handling and deep-learning analysis

Multiplexed

Multiplexed insights through 4-color fluorescence readouts

A solution to scale

Avidion launches with full support of cell-cell avidity measurements, applicable to a broad range of cell therapy research such as CAR-T therapy development. Later upgrades give customers direct access to Cell Avidity for cell engager and antibody therapy research.

Launch applications

- **Cell Therapy (CAR T, TCR T, NK, etc.)**

Post-launch applications

- **Cell Engagers**
- **Antibody Therapy**

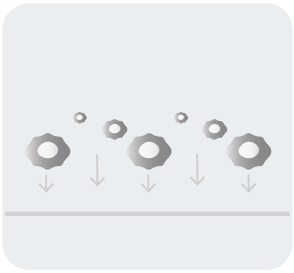
Workflow

Easy to use, impactful results

Measure the overall strength of interaction between cells or between proteins and cells, quickly and easily.

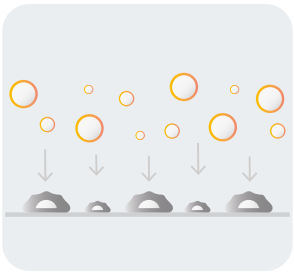
Introduce your target cells

Load up to 4 Avidion cartridges and your selection of adherent or non-adherent target cells, using standard 96-well plates. Avidion automatically transfers the cells, performs incubation and monolayer quality control.



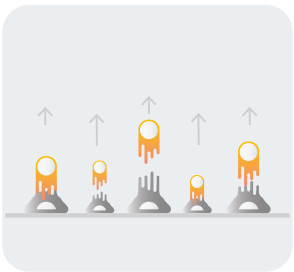
Add your media and effector cells

Introduce up to 192 fluorescently labeled effector cells in separate 96-well plates. Avidion automatically introduces them to your target cells.



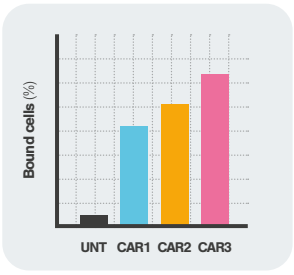
Automated Cell Avidity measurements

After the right incubation time, the measurements automatically begin. With a gentle centrifugal force and all the necessary multicolor images, true cell binding is revealed.



View your results and sign off for the day

Get direct access to Cell Avidity insights thanks to Avidion's on-board analysis. With disposable cartridges and automated cleaning, you can shift your focus to your next experiment.



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Software

Your new data acquisition and analysis experience

Design, execute and analyze your experiment with ease and confidence. Our software delivers an intuitive experience combined with powerful algorithms for the most complex binding behavior.

An easy way to prepare your experiment

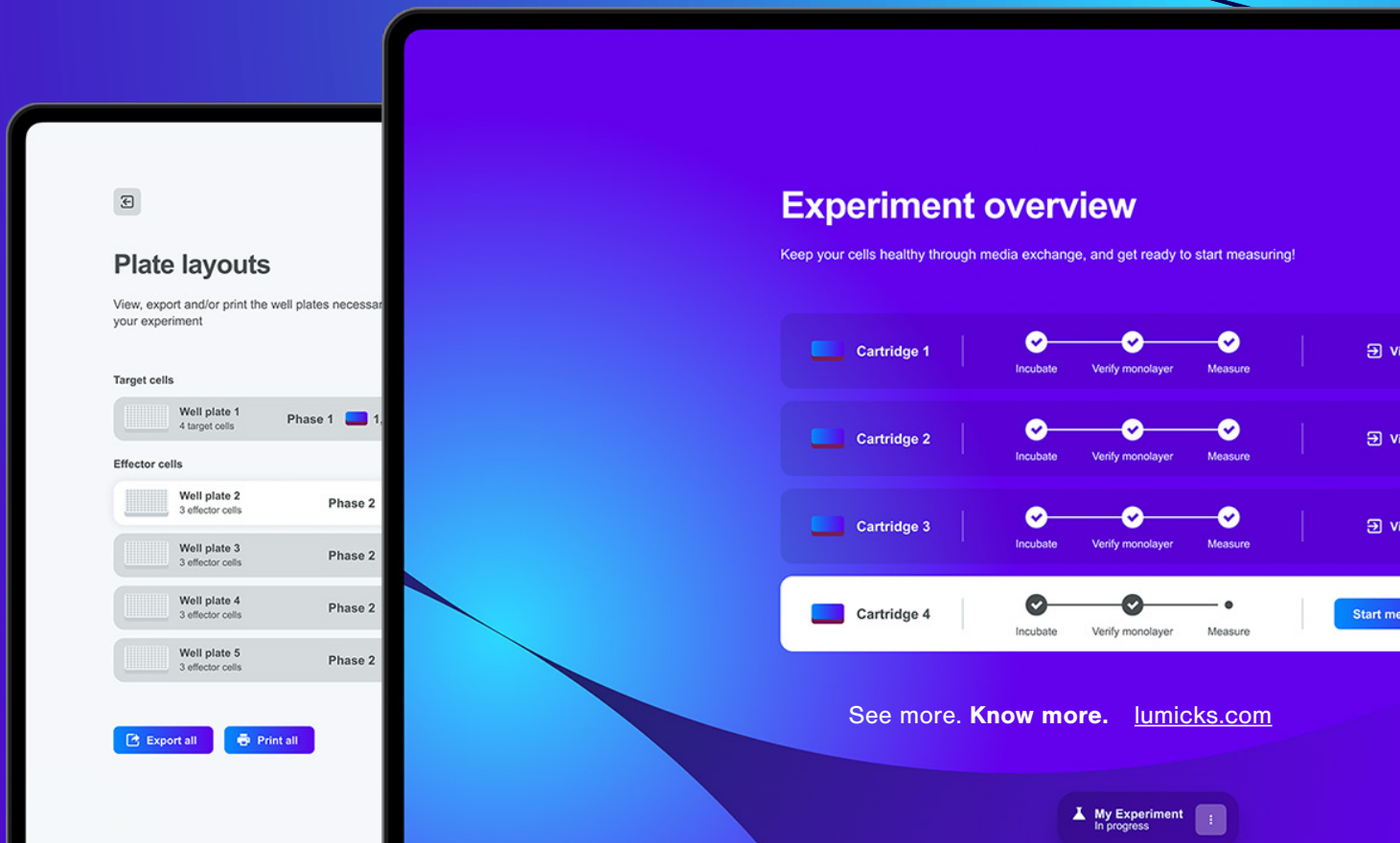
Design the perfect experiment with our intuitive UI. You'll receive a clear overview of experiment phases, reagents and 96-well plates layouts.

Enjoy an automated workflow with minimal hands-on time

Enjoy a guided experience with clear actions and information presented throughout your whole experiment.

Obtain immediate insights and study them wherever, whenever

Your data is ready straight after the experiment. Study and analyze it from the comfort of your desk, or home.



See more. **Know more.** lumicks.com

Multiplexing features

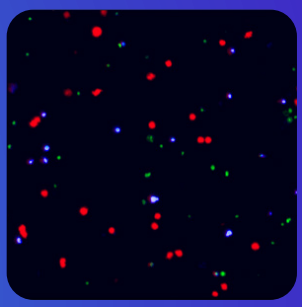
Multiplex your colors, **Multiply your insights.**

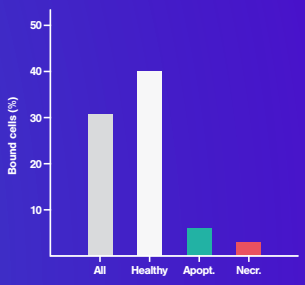
DAPI **400**
FITC **470**
TRITC **555**
Cy5 **630**

Staining with small molecules

Unlock deeper insights with signal-specific gating

Explore activation and viability markers to add functional context to your studies and achieve highest data quality.



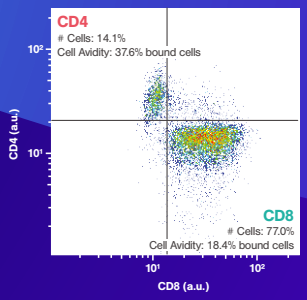


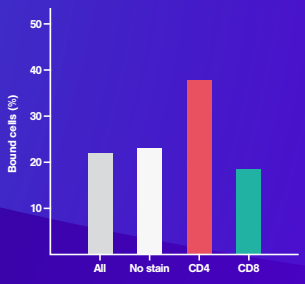
Jurkat cells on Nalm6 were cultured to increase the apoptopic and necrotic fraction, which were labelled with Caspase and Sytox, respectively. The bar plot shows that gating apoptotic and necrotic cells enhances the Cell Avidity measurement, as would be expected.

Staining of surface receptors with antibodies

Differentiate subpopulations with precision

Characterize subpopulations like CD4/CD8 T cells, or memory vs effector states and measure cell avidity across phenotypes.



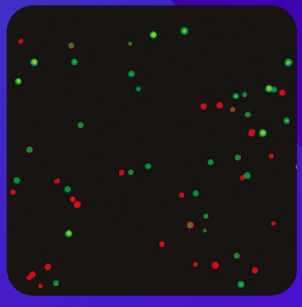


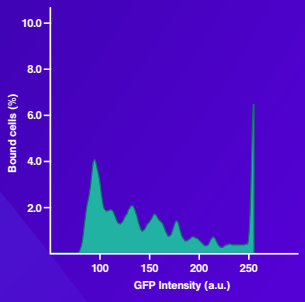
Purified CD4+ and CD8+ cells were mixed and expanded in culture for 14 days. CD8 antibody PerCP-Cyanine5.5 and CD4 antibody FITC were used together with Cell Trace dye. CD4+ and CD8+ cells were gated and the bar plot shows cell avidity for each subpopulation.

Detection of fluorescent proteins

Streamline transduction analysis without extra staining

Leverage fluorescent protein expression to assess CAR levels and co-expression markers.





GFP was co-expressed with a CAR construct in CD8 primary T cells.

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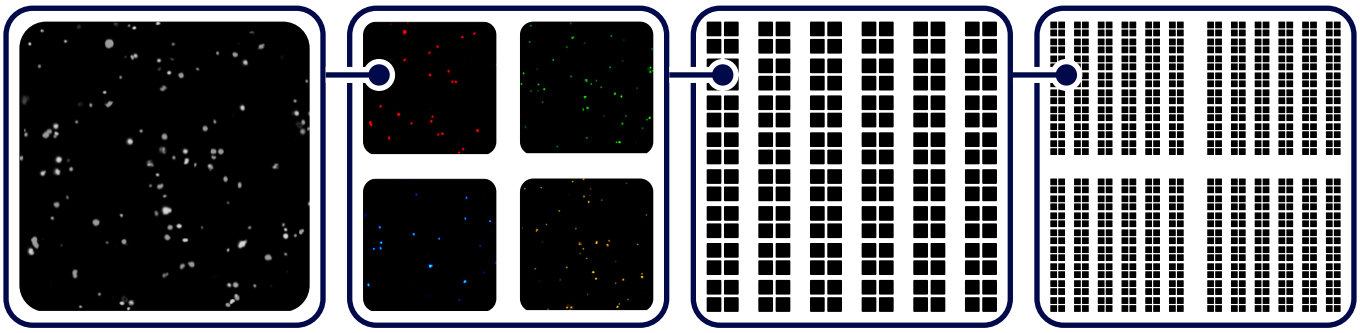
Throughput

Screen 192 samples within 80 min. hands-on time



800 cells

Up to 800 cells analyzed per well

4 colors

Cell Avidity + 3-color fluorescence for multiplexed insights

48-well cartridge

Up to 48 wells per Avidion cartridge

192 samples per day

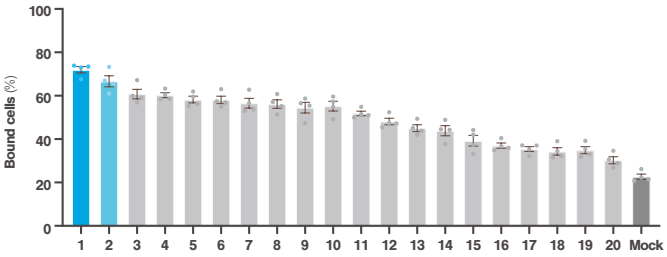
Run up to 4 cartridges per experiment within 80 min. hands-on time

Case study

How many Cell Avidity measurements can you do in a day? A good example is a CAR-T cell screening project performed in collaboration with Professor Dirk Busch and Elvira D'Ippolito at Technical University Munich. Using Avidion, it's possible to test and rank 20 CAR constructs in just half a day.

Rapid screening

20 Jurkat CAR constructs screened in a single day. Each sample was measured with 4 technical replicates.



Cost & time efficiency

Early, robust identification of top candidates.

Repeatable and reproducible results

Tight error bars and SDs confirm assay robustness.

Platform

Take a look inside

Discover the advanced technology and engineering that makes Avidion possible

Liquid handling system

Automatically manages media exchanges and reagent additions, ensuring consistent and reproducible biology.

Centrifuge

Gently applies a controlled force to assess multi-receptor binding, distinguishing strong interactions from weaker ones.

Incubator

Ensures optimal conditions for your target cells in preparation for your experiment.

Multicolor fluorescence imaging

Unlocks multiplex imaging and enables Cell Avidity experiments including cell population phenotyping, receptor expression, and transduction efficiency.

Deep-learning enabled graphical processing

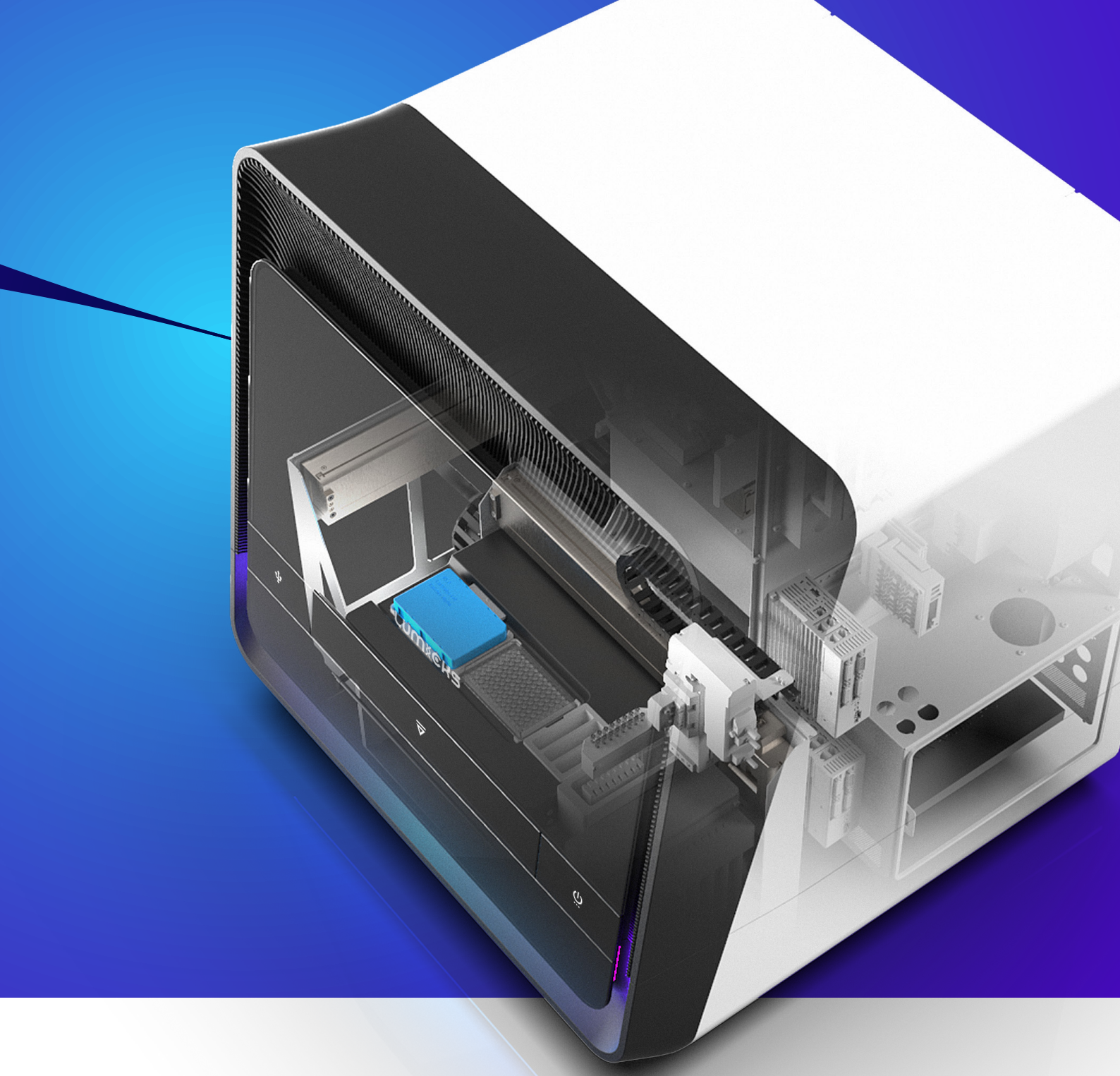
Delivers exceptional data quality through automated, intelligent quantification, ready for you right after your experiment.

Robotic cartridge handling

Seamlessly moves your cells through all of the Avidion's compartments, delivering near hands-free operation.

Specifications

- Force application: Centrifugal force
- Data output: 4-color fluorescence (Cell Avidity + 3 colors)
- Fluorescent wavelengths: 400 / 470 / 555 / 630 nm (DAPI/FITC/TRITC/Cy5)
- Dimensions (L x W x H): 82 x 85 x 90 cm (excluding peripherals)
- Consumable: Disposable cartridge (24 or 48 wells). Cell monolayer adhesion is enhanced by a surface treatment that exposes carbonyl groups and does not affect cell viability.
- Throughput: 192 measurements per day (4 cartridges with 48 wells)
- Number of cells measured: Up to 800 cells per measurement



Sample requirements

- Accepts 96-well plates, round bottom (typical brands supported)
- Accepts standard media and cell densities
- Compatible with adherent or suspension cultures

Cell Avidity is being adopted by pioneers across the globe.

“There’s something very elegant about the solution. Avidion makes it exceptionally straightforward. You make the layer. You see the cells. There’s a building of confidence. Yes, I’ve done this right. Now there’s nothing left but the physics of the force being applied. The cell either comes off or it doesn’t come off and you’ll have that quantified. It’s a concrete and binary result. Now that’s something you can hang your hat on.”

Peter Chockley, PhD, The Ohio State University College of Medicine

“Fine-tuning the cell avidity of anti-CAIX CAR T cells mitigates on-target, off-tumor toxicity... ensuring only CAIX-high tumor cells are killed.”

Yufei Wang, PhD, Dana-Farber Cancer Institute

“Interestingly, of the pre-clinical assays used to compare CAR constructs, only binding avidity correlated with *in vivo* results.”

Marcela Maus, MD, PhD
Massachusetts General Hospital

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"...the LUMICKS platform allowed us to establish poor tumor binding (or avidity) as a likely explanation for suboptimal clinical responses in AUTO2."

Lydia Lee, PhD, University College London

"Cell Avidity measurements provide key information that can accelerate immunotherapy development by accurately predicting *in vivo* and clinical efficacy."

Mark Lowdell, PhD
University College London & INmune Bio

"[The] high throughput [and] larger datasets to understand the correlation between binder characteristics and CAR-signaling quantity and quality is definitely the way to go."

Markus Barden, PhD
LIT-Regensburg

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