APPLICATION NOTE

semarion

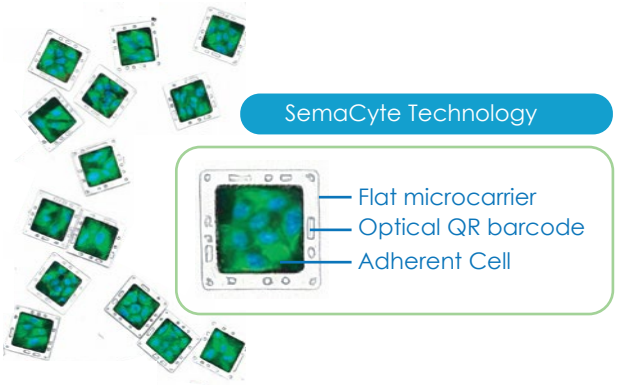
Data-Rich Compound Profiling at Scale

Multiplexing Frozen, Assay-Ready Cell Models for Automated High-Content Pharmacology

High-content imaging enables richer compound profiling, but screening across multiple cell models can be limited by throughput, assay preparation and imaging capacity. SemaCyte® microcarriers transform adherent cells into frozen, optically barcoded, assay-ready reagents that can be thawed, pooled and dispensed on demand. Multiplexing cell models within the same well enables model-specific dose–response measurements while reducing plates, cells and reagents.Compatible with automated liquid handling and high-content imaging, SemaCytes increase profiling capacity and reduce cost per datapoint. Here, multiplexed DNA damage response and pERK inhibition assays demonstrate robust potency measurements, differential cellular responses and agreement with conventional well-plate data, supporting more informed compound prioritisation and faster DMTA cycles.

Data Richness: Potency and cellular responses across models in the same well
Throughput: Profile more cell models with fewer plates, cells and reagents
Assay-Ready: Bank, thaw and dispense adherent cells into automated workflows

Barcode & Multiplex Adherent Cells for Data-Rich High Content Screening



SemaCyte® microcarriers are microscopic, optically barcoded wells that turn adherent cells into assay-ready reagents. Cell models can be prepared and cryopreserved in advance, then thawed, pooled and dispensed on demand.

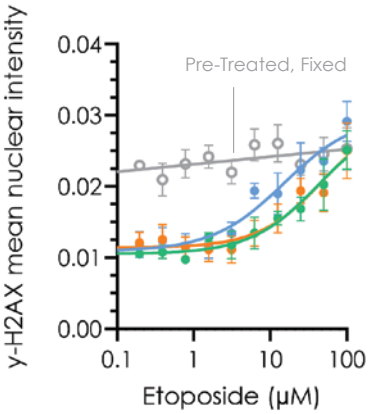
Each model is identified by its unique brightfield barcode, enabling cell-specific image analysis within the same well. Compatible with automated liquid handling, washing and imaging, SemaCytes enable larger cell panels to be profiled without proportionally increasing plate count or resource use.

Barcode. Bank. Pool. Profile.
More cell models. Richer pharmacology. Fewer plates.

4-Plex DNA Damage Response: Multiplexed γH2AX Profiling

Three cancer cell types and a pre-treated, fixed reference control were cryopreserved on distinct SemaCyte barcodes. Following thawing, pooling and dispensing, cells were treated with etoposide, stained for γH2AX and imaged on the CellInsight CX7.

Model-specific dose–response curves revealed differential sensitivity, with cancer type 1 showing the strongest response at lower concentrations. EC_{50} values closely matched historical well-plate controls (within 1.2-fold), despite using approximately 6× fewer cells per condition. The embedded reference control provided an additional means of monitoring assay consistency.



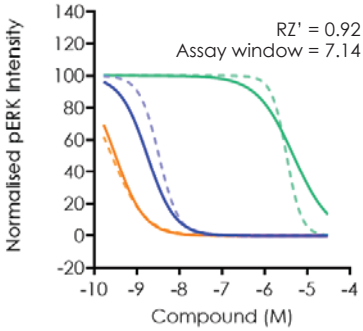
	Multiplex SemaCytes	Wellplate Control
Cancer Type 1	15	16
Cancer Type 2	43	49
Cancer Type 3	48	57

EC50 Values (μM)

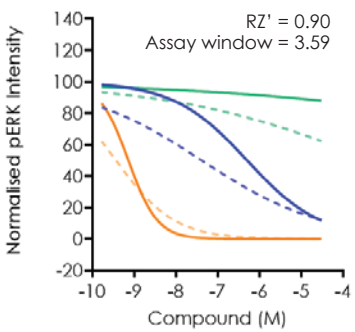
5-Plex pERK Inhibition: Model-Specific Potency & Selectivity Profiling

Five cancer cell models were biobanked on SemaCytes and multiplexed to profile pERK inhibition across 15 compounds. Following thawing, pooling and Multidrop dispensing, automated assay processing and imaging generated model-specific dose–response curves and pIC_{50} values. Results from two representative cell models and three compounds demonstrate distinct, model-specific potency profiles, enabling direct comparison of compound sensitivity and selectivity. Fresh and cryopreserved cell concordance highlights the feasibility of frozen, assay-ready cell banks for quantitative pharmacology.

Cancer Type 1



Cancer Type 2



	Cancer Type 1		Cancer Type 2	
	Fresh	Cryo	Fresh	Cryo
Compound 1	8.8	8.5	6.3	7.4
Compound 2	5.3	5.5	No effect	No effect
Compound 3	9.5	9.6	9.1	9.4

pIC50 Values