Cyto-Mine®: Single cell analysis and monoclonality assurance system for B-cell and Hybridoma screening

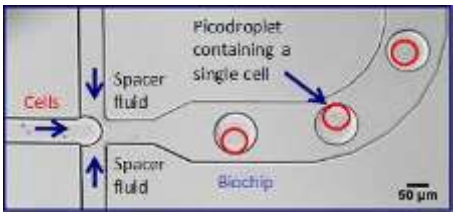
Corporate:

Sphere Fluidics Ltd, an established Life Sciences company based near Cambridge (UK), develops unique products for use in single cell analysis and characterisation and provides collaborative R&D services. The Company has 54 patents (12 patent families with 25 patents being granted) and over 140 international customers. To enable a step-change in the way the biopharmaceutical industry finds and isolates rare cells producing biologics of interest, Sphere Fluidics is currently developing Cyto-Mine®, the single cell analysis and monoclonality assurance system.

Key Application Areas:

- **Biopharmaceutical Discovery**:
  Isolation, assaying, sorting and dispensing of individual B-cells or hybridomas based on antigen specificity.
- **Bioprocessing:**
  Analysis of heterogeneous cell populations for identification and cloning of the highest-secreting single cells.
- **Quality Assurance:**
  Allows ongoing analysis of working cell lines to detect early onset of potential genetic drift of bulk cultures.

Advancing the Discovery of Monoclonal Antibody Biologics:

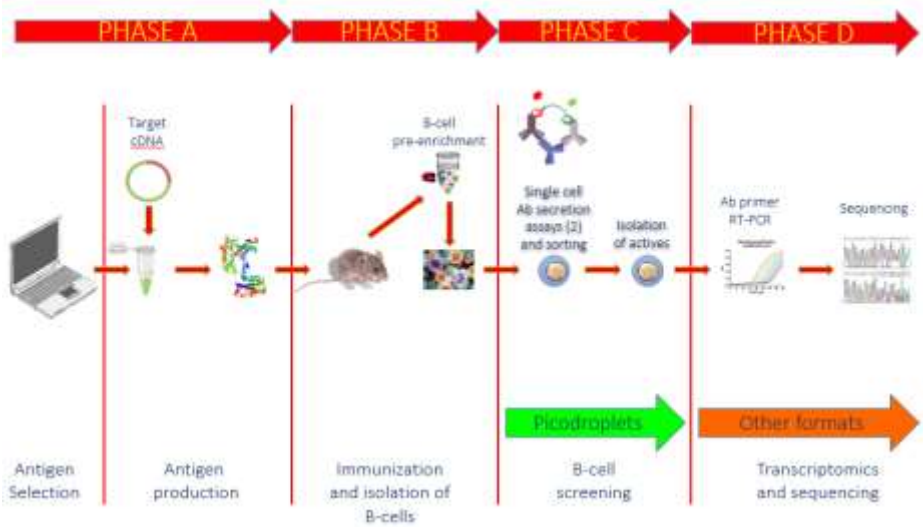


Sphere Fluidics has developed unique technology to enable a step-change in the way the biopharmaceutical industry finds and isolates antigen-specific B-cell and hybridoma clones. Using proprietary picodroplet technology and microfluidics, the platform compartmentalises cells into individual aqueous picodroplets. Each picodroplet is analysed and sorted, and only those containing a single cell producing antigen-specific monoclonal antibodies are collected to wells of microplates. In a few hours, the platform can analyse antibody production from up to a million primary B-cells or hybridomas. The platform will deliver significant savings in time and consumable costs with greater statistical accuracy in rare cell recovery.

System Features:

- Processes up to 1 million B-cells or hybridomas in less than half a day.
- Directly assays each individual cell for antigen-specificity in culture medium environment.
- Multiplex assay system permits screening based on multiple parameters.
- Isolates up to 5,000 antigen-specific single cells into individual wells with high viability.
- Single-use, disposable flow pathway ensures sterility and minimal turnaround time.
- Benchtop system compatible for use in Class II biosafety cabinet.

Primary B-Cell Analysis:



Cyto-Mine® (Phase C)

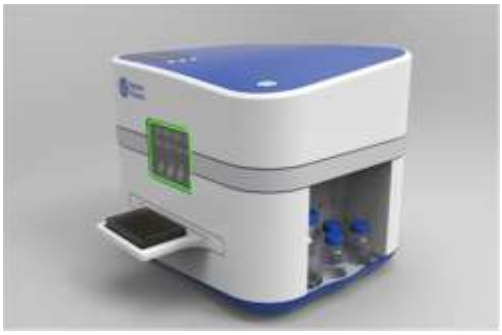
Analyse ~ 10^6 primary B-cells in a few hours.

Single cell dispensing - Monoclonality Assurance

Sterile workflows in self-contained Cyto-Cartridges™

Technology Comparison: Current Technologies

Technology Comparison: Cyto-Mine®



Parameter	Technology Comparison / Approach			
	Manual / Limiting Dilution	**Automation / Clone Pickers**	**Flow Cytometry / FACS**	**Picodroplets / Cyto-Mine®**
Throughput/Run	1,000	10,000	> 1 billion	Up to 1 million
Time Per Run (days)	90	21	1	< 1
Monoclonality Efficiency (%)	8 - 40	95.6	98 to > 99	≥ 99.9
Single Cell Compartmentalisation	No	No	No	Yes
In-Line Assays	No	No	No	Yes
Single-use Disposable Flow Path	Yes	No	Yes/No	Yes
Cell-cell Interaction Studies	No	No	No	Yes
Optical analysis and Verification	No	Yes/No	Yes	Yes
Low Shear Forces	Yes	Yes	No	Yes
Detects Low-abundance, Cell-Surface Proteins on a Single Cell (using enzyme amplification)	No	No	No	Yes
High Accuracy	No	Yes/No	Yes	Yes
Small Footprint/Size	Yes	No	No	Yes
Sample Environment Sterility	n/a	Yes	Yes/No	Yes
Enables Single Molecule Assays	No	No	No	Yes

Cyto-Mine® Technology Access Program:

- Early access to this leading-edge, disruptive technology will provide the Technology Access Partner with:
  - Reductions in operational costs, time and resource.
  - Significant advantages over competitors.
- Provides opportunity to help shape the product platform to better meet specific, operational requirements.
- Product development costs are shared over a small number of Partners, providing significant cost savings.
- Each Partner gains early access to the instrument platform, Cyto-Cartridges™, specialist chemicals, patent licenses, technical and application support.
- The program includes upgrading of an early (or alpha) version to a full production system.
- Partners receive ongoing discounts on future purchases of instruments and consumables.

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