CliniMACS Electroporator
For use with CliniMACS Prodigy

Matthew Cobb, Clinical Account Manager; Cell and Gene Therapy
Recap – Prodigy Validated Applications

- BM-133 Enrichment
- LP-34 Enrichment
- LP-TCRab/19 Depletion
- CCS-IFN Enrichment
- LP-14 Enrichment
- MoDC Generation
- CAR T process
Electroporation - Applications

Scope

- Transient gene expression (mRNA)
- Gene knock out: Nucleases (ZnF, TALEN, CRISPR...)
- Gene integration
  - Transposase (Sleeping Beauty, piggybac...)
  - ds break induced homologous recombination: Nucleases (...)

Applications

- DC loading for antigen presentation
- CAR expression
- Expression of survival / migration / costimulatory factors ...
- Knock out of endogenous TCR
- Knock out of inhibitory signalling proteins
- Safety switch (thymidine kinase, caspase 9)?
- Gene therapy (HSCs)
Electroporation - Module Addition

Cells provided from external source or from CliniMACS Prodigy

Electroporation cuvette (4 mm or 2 mm)

Two connections to Prodigy Tubing Sets

Bag for cells

Bag for Electroporation material
Validation - Test Cuvette Adapter (TCA)

- Included in delivery of the CliniMACS Electroporator
- Adapter to enable manual cuvettes to be used on Prodigy Electroporator
- Used for initial tests and demonstrations e.g. pulse optimisation, electroporation efficiency, viability etc.
- Easy upscaling for testing and transfer of electroporation parameters on the CliniMACS Electroporator
- Transfer of optimised conditions to tubing sets
CliniMACS Prodigy and Electroporator - Tubing Set(s)

- EP-2 tubing set (2mm)
- EP-4 tubing set (4mm)
  - Electroporation cuvette (2 mm / 4 mm electrode distance)
- 2 Cell bags
- 1 material bag
- Combination of Prodigy and Electroporator tubing sets
CliniMACS Electroporator – Electroporation chamber

- CliniMACS Prodigy Controlled
- Closed system
- Automated, cyclic electroporation of 15-50ml
- Square wave pulse (single or double)
- Variable protocols and pulsing parameters (500V-1000V)
- Wider facility of cell product manufacturing
- A broader platform for cell manufacturing
Finding the right balance for parameter input

Sensitivity to electric pulse varies for different cell types.

Optimal combination of electric field strength, time constant and ionic strength of buffer has to be determined for each cell type to produce maximum transfection rates and maintain cell viability!

CliniMACS Electroporator is parametrizable:

- Voltage HV (0-1000V)
- Duration HV pulse (10 μsec-1sec)
- Voltage LV bank (50-500 V; condition: ≤ Voltage HV)
- Duration LV pulse (0 μsec-1sec)
- Pulse mode (burst y/n)
- if burst mode = yes; burst lenght (5 μsec- durHV; 1 μsec sensitivity)
- Pulse polarity (toggle y/n)
Electroporation - Process Indication by colour
## Requirements and Solutions

<table>
<thead>
<tr>
<th>Customer transfection needs</th>
<th>CliniMACS Electroporator solutions:</th>
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<tbody>
<tr>
<td>Viability &gt; transfection efficiency</td>
<td>TCA for electroporation optimisation</td>
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<td>Large amounts of cells to be electroporated</td>
<td>Automated loading for large volumes</td>
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<td>Can be electroporated in a sterile, closed system</td>
<td>Sterile tubing sets</td>
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<td>Cell expansion after electroporation</td>
<td>Cells directed to CCU</td>
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<td>Enriched population</td>
<td>Process on Prodigy</td>
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Just like the Prodigy, the electroporator can be used from process development to clinical production.
Contact Details and Questions

- **Matthew Cobb**
  - Clinical Account Manager (UK North)
  - matthewco@miltenyibiotec.co.uk

- **Michael Schenk**
  - Clinical Applications Specialist
  - michaelsche@miltenyibiotec.co.uk

- **Antonio Di Rocco**
  - Clinical Applications Specialist
  - antoniod@miltenyibiotec.co.uk