New single cell isolation and dispensing technology for rare cell samples

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Introduction:
CellenONE®, a single cell isolation & dispensing technology was developed and successfully applied to isolation of single cells from rare samples containing very few cells (e.g. cerebrospinal fluid (CSF) samples). This gentle technology demonstrates outstanding single cell precision and recovery making it an ideal tool for both single cell analyses of clinical samples and for cloning applications.

Aim of project:
Isolation of single cells from subsets of immune cells in multiple sclerosis (MS) patient’s CSF sample for single cell RNA sequencing. Elucidate which cells within subset are disease relevant in chronic neuroimmune disease.

Proof of concept experiments were carried out using peripheral blood mononuclear cells (PBMC) at low cell numbers equivalent to cells of interest in CSF.

Conclusions:
- Ideal for analysis of single cells from clinical samples
  - recovery up to 97% of cells present
  - from minute samples (from just 2µL)
- Outstanding single cell precision (up to 100%)
- Suitable for a range of cells from 2 to 35µm diameter
  - essential to study sample’s heterogeneity
- Very gentle dispensing maintains high cell viability
- High throughput
  - 100 single cells isolated < 4 minutes

Principle:
- piezo acoustic-based dispensing
- automated optical monitoring
- machine learning step to map dispenser
- cell’s position define if single cells will be present in next generated droplet

Mapping & single cell condition:

Results:
Concentration calculated from 5x 5µL PBMC aliquots
= 68 +/- 7 cells (Average Input)

Single cell isolated from a 5µL PBMC aliquot
= 63 single cells (Output)

Average recovery = 97%

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