FloDesign Sonics

One study shows a 160-fold volume reduction factor and an 84 percent yield of viable cells with no significant loss in viability.

We use the same acoustic driver and process automation for both low and high starting cell densities. Only the acoustic chamber is changed to meet the requirements of the specific process. So, one control system can be used in multiple applications and we can tailor the hardware to your specific application.

Case Study: Concentrating Primary Cultures of T-cells

Summary: FloDesign Sonics' concentrate/wash platform was used to concentrate cultures of activated primary T-cells. Two starting densities of the cultures were tested; the first a low cell density on the order of 1M/ml and the second a high cell density 30-fold higher in concentration. The concentration test of the low cell density culture is typical for a pre-electroporation concentration process. The high cell density experiment is typical for a harvest concentration process.

FloDesign Sonics' universal electronics platform was used to excite the transducer and control the process. Two different single-use acoustofluidic chambers were used; one sized for the low cell density culture and a second for the high cell density culture. The acoustic chambers were designed to meet the desired throughput and output requirements of final cell density of the concentrated cells and total volume of the concentrated cell solution.

Procedural Steps for Both Samples

1. Open and install acoustic element and integrated tubing kit into the acoustic concentration hardware and fluid path. (The kit was double-bagged and gamma irradiated.)
2. Connect the acoustic transducer to the control system.
3. Sterile weld the T-cell culture bag to the tubing kit.
4. Connect the external cooling loop to the acoustic element.
5. Input and initiate process parameters such as volumes, power, and recirculation time into the control software.
6. Remove the product bag with concentration cells using a tube sealer after the concentration process was completed.
7. Determine cell number and viability.

Results

Figure 1. Result of the acoustic concentration process

Process Inputs	Low Cell Density	High Cell Density
Kit Used	FDS-1LE	FDS-1LH
Volume (mL)	1105.8	949.9
Viable Cell Density (million/mL)	1.86	35.3
Total Viable Cells (billion)	2.1	33.5
Cell viability (%)	99.1	98.8
Process Outputs		
Volume (mL)	6.9	48.9
Viable Cell Density (million/mL)	250.7	587
Total Viable Cells (billion)	1.7	28.7 B
Cell viability (%)	97.9	98.0
Process Performance		
Viable Cell Recovery (%)	84	86
Volume Reduction Factor	160-fold	19-fold
Process Time (minutes)	51	33

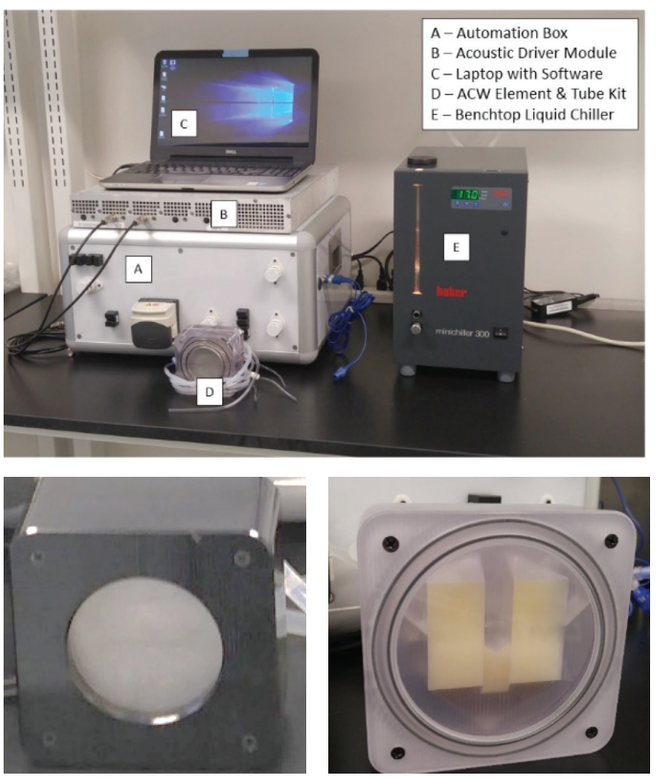

Figure 2. Photos of Experimental Setup and Elements