

# New Invention: Harvesting CHO and HEK293 Cells with the Rapid Clear® Cap provides 0.2µm sterile filtration in a fraction of the time required by traditional clarification methods

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The Thomson Optimum Growth™ Family of products is expanding into downstream processing with a revolutionary new technology that allows high speed clarification of cellular material. Simply switch the standard vented Optimum

Growth™ Cap to the Rapid Clear® Cap (patented). The only equipment required is a peristaltic pump. In initial testing, the Rapid Clear® Cap can filter up to 2.5L-3L of high density culture [ $6 \times 10^6$  -  $20 \times 10^6$  @ >70% viability] in approximately 18 minutes.

At lower or higher densities and viabilities the total volume and processing speeds will differ. This technique will transform the time consuming and laborious process of harvesting cells to a rapid, walk away procedure.

Stable CHO Cells density was  $10 \times 10^6$



Beginning average Flow rate ~ 200ml/min  
Flow rates slow nearing filter capacity,  
average Flow Rate ~ 110ml/min



To maximize culture recovery, add 500mL of 1x PBS to the flask to flush the system at the end of filtration



ExpiCHO™ from culture bag to Optimum Growth-Port Flask



HEK 293 Cell density @  $3.5 \times 10^6$



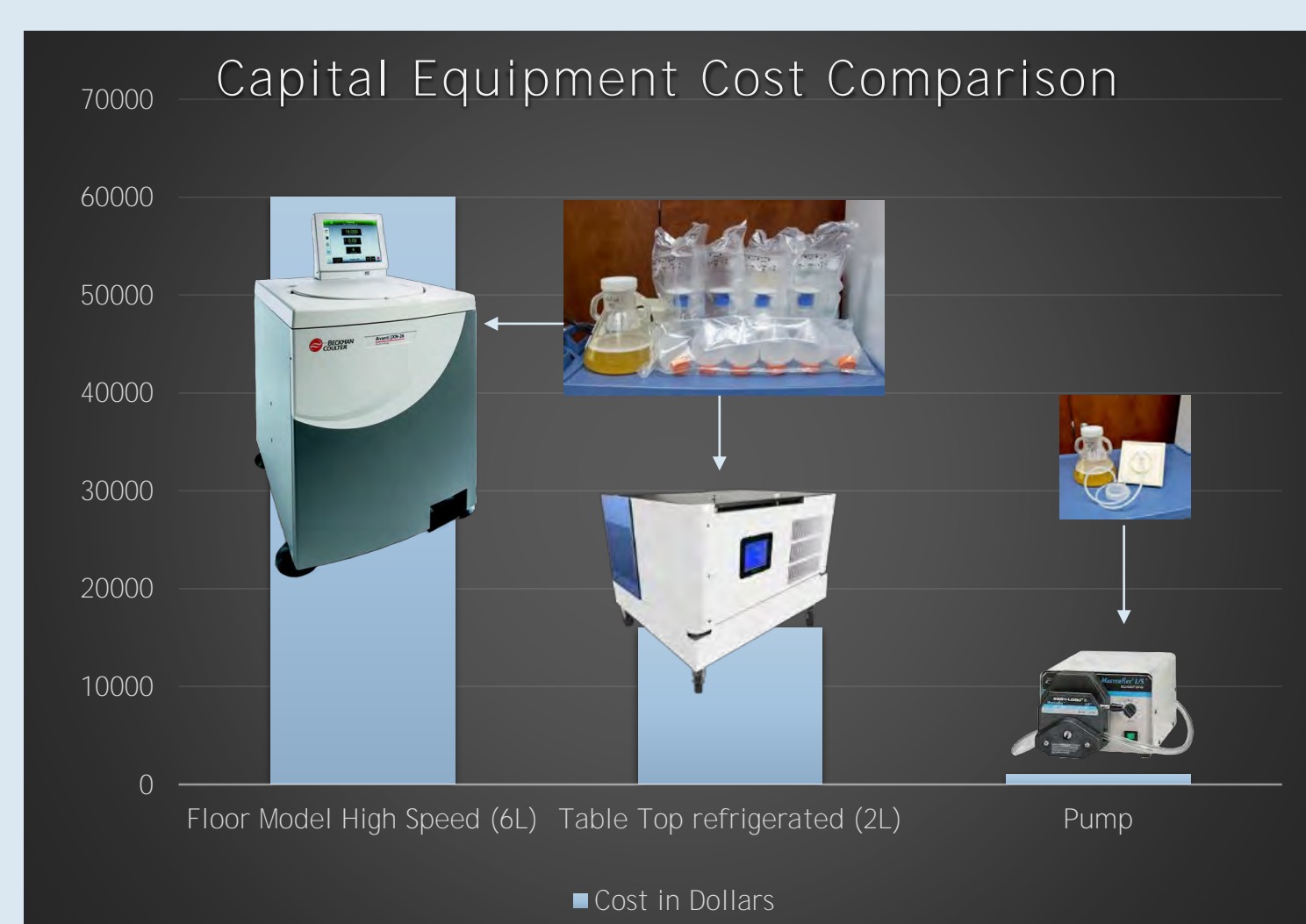
Beginning average Flow rate ~ 200ml/min  
Flow rates slow nearing filter capacity,  
average Flow Rate ~ 110ml/min



For densities <  $6.0 \times 10^6$  may flow faster



ExpiCHO™ Cells are filtered with a density of  $8.4 \times 10^6$



Current Method Components



New Method Components



VS

The Rapid Clear® Caps (patented) from Thomson are a valuable tool for direct-cell harvest. They successfully transform **finished cultures in an Optimum Growth™** Flask to sterile 0.2µm clarified conditioned media in a single step. When performing these experiments with beta-testers, we have been able to cut the average processing time per liter from 80 minutes to 6 mins/L per start to finish. In ~6 mins/L the Rapid Clear system can transform a media/cell slurry ready for downstream processing whether going to purification, TFF, or long-term storage.

Rapid Clear® Caps have been used with high expressing cell lines such as Transient CHO or Stable CHO cell lines. For example, ExpiCHO™ System from Thermo Fisher Scientific, CHO stable cell lines including CHO-K-1 and CHO-S, Transient CHO (Mirus Bio, Lonza, Sigma-Aldrich, Inc). These cell lines have yielded high titer expression in minimal culture volumes. Customers have been able to reduce the volumes from ~10L to 2-3L of media with higher cell densities (above  $7 \times 10^6$  +) yielding high titers. The Rapid Clear® Caps removes harvesting as the bottleneck.

In customer testing, Rapid Clear® Caps have been able to harvest a variety of cell densities, and viabilities. All conditions tested require less time from start to finish than is required for centrifugation alone, while average processing times depend on the cellular density and viability at the time of harvest. Higher volumes are achieved when the cultures are at 99%- 70% viability. Additionally, the caps have been used at both high and low viability harvests

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