Scalable solutions for cell isolation and expansion

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To realize the potential of revolutionary cell therapy treatments, challenges of safety and cost must be addressed. Scale-up of cell manufacture is a key approach to mitigating these issues. Gibco™ CTS™ DynaCellect™ Magnetic Separation System for the isolation and bead removal of cells and stirred tank bioreactors for cell culture are two scalable building blocks for cell therapy manufacturing processes that can help combat common industry challenges.

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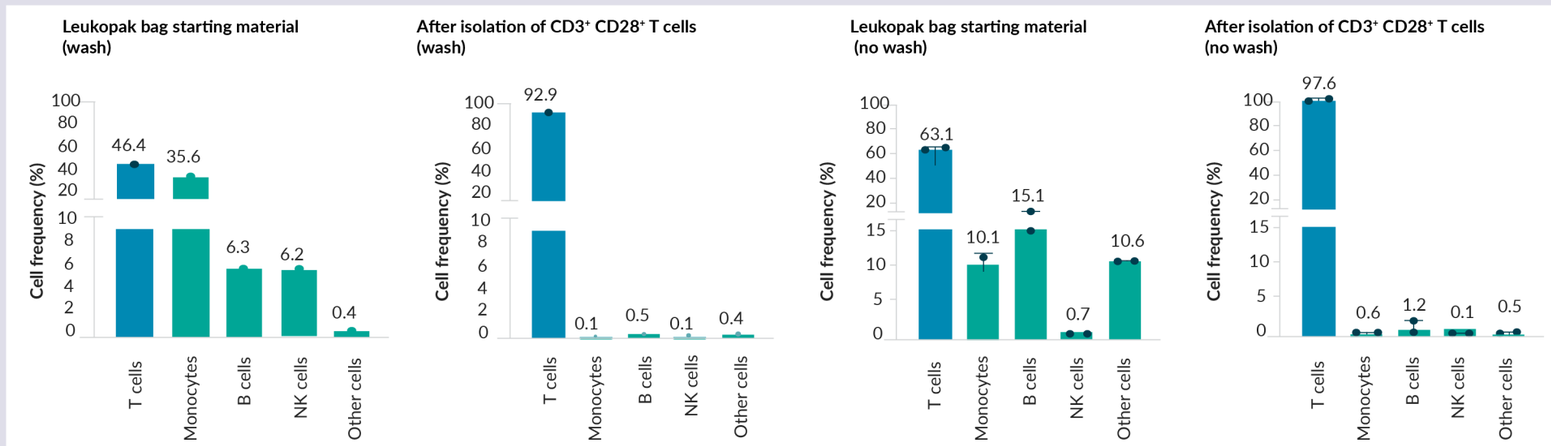
CTS DYNACELLECT MAGNETIC SEPARATION SYSTEM

Designed for use with Gibco™ CTS Dynabeads technology, the highly scalable, closed and automated CTS DynaCellect can be used for both cell isolation and bead removal.

The isolation process achieves >90% isolation efficiency of target cells with ~95% purity and no impact on cell viability, with or without a wash step (Figure 1). The CTS DynaCellect process is scalable up to 1 L or 10 billion target cells per isolation reaction, with a throughput time of ≤100 minutes.

The automated bead removal process is fast and efficient, and currently results in >85% target cell recovery. Bead removal is achieved through a continuous flow to ensure rapid processing of volumes that are both characteristic of autologous and allogenic workflows (Figure 2).

Figure 1. Leukopak bags were used in a one-step isolation and activation using the CTS DynaCellect, with and without a wash step prior to isolation.



STIRRED TANK BIOREACTORS

Following upstream cellular processing, stirred tank bioreactors have been identified as the most effective, scalable, and flexible closed and automated vessels for expansion of cell therapies. They possess superior control over culture characteristics, including mixing, gassing, and liquid exchange. These capabilities have improved yields compared to other dynamic and static bioreactors, whilst still maintaining the same levels of early memory cells. Ramped agitation sustains growth and viability and can support higher viable cell density (Figures 3 & 4). Moreover, stirred tank bioreactors are associated with a relatively small footprint and can be readily assimilated, both physically and digitally, into closed and automated workflows.

CTS DynaCellect and stirred tank bioreactors represent scalable, closed and automated building blocks for a cell therapy manufacturing process, which can mitigate overarching current and future challenges relating to safety and cost.

Figure 2. Process scalability and flexibility of bead removal.

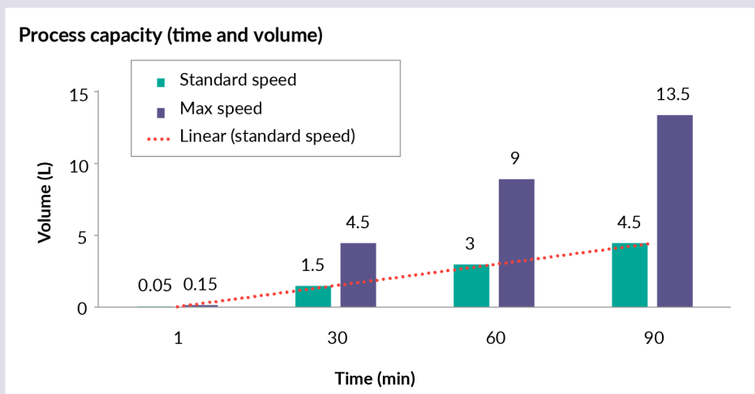


Figure 3. Dynamic reactors show improved expansion. Results are representative of more than five independent experiments.

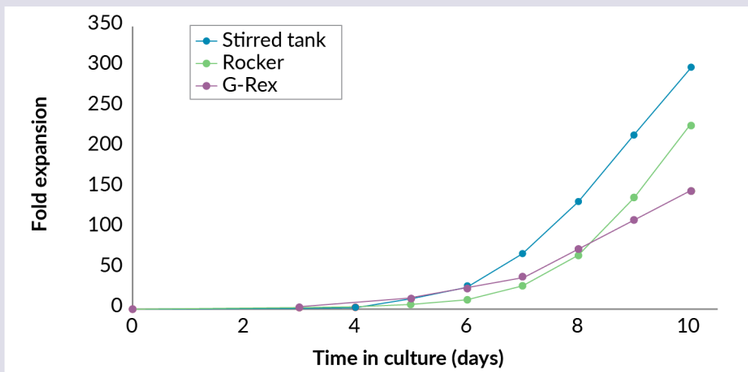
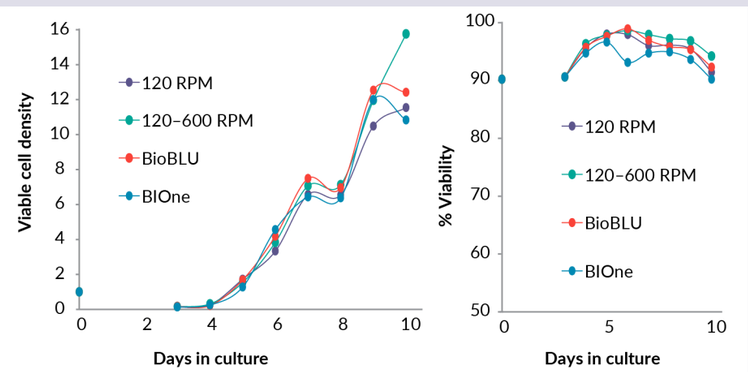


Figure 4. Increased agitation enhances T cell expansion and supports higher cell densities.



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