PROOF-OF-CONCEPT OF A NOVEL SCALABLE MAGNETIC BEAD-BASED CELL SEPARATION TECHNOLOGY

Nils A. Brechmann, AdBIOPRO, Competence centre for Advanced BioProduction by continuous Processing, Sweden; Cell Technology Group (CETEG), Dept. of Industrial Biotechnology, School of Engineering Sciences in Chemistry, Biotechnology and Health (CBH School), KTH Royal Institute of Technology, Stockholm, Sweden; nabr@kth.se
Kristofer Eriksson, AdBIOPRO, Competence Centre for Advanced BioProduction by Continuous Processing, Sweden; MAGic Bioprocessing AB, Uppsala, Sweden
Véronique Chotteau, AdBIOPRO, Competence Centre for Advanced BioProduction by Continuous Processing, Sweden; CETEG, Dept. of Industrial Biotechnology, CBH School, KTH, Stockholm, Sweden

Key words: cell separation, magnetic bead separation, cell sorting

Advanced Therapy Medicinal Products (ATMPs) are gaining great interest for the treatment of severe, currently consider incurable, diseases. Therapies based on stem cells have an enormous potential in applications such as cardiac cells and neurons to name a few. However, the production of these cell systems is expensive, complex and lack, nowadays, scalability both for their cultivation and the purification. The lack of scalability is a major bottleneck to bring these therapies to patient at commercial scale.

Magnetic beads are well-established for sorting of cells, e.g. magnetic activated cell sorting. However, today´s systems size is still limited in terms of scale-up potential. We have developed a new scalable separation process based on the magnetic bead MAG for the isolation of receptor positive cell subpopulations. We have previously published that our new magnetic bead system MAG is extremely gentle towards cells[1] and can easily be scaled up at pilot-scale for the separation of monoclonal antibody from a cell suspension[2]. In the present study, this magnetic bead system has been further developed for cell separation. In a model system with a mixture of hMSC and $HER2^+$ SK BR3 cells (20:80), a proof-of-concept was demonstrated showing exceptional elimination of the $HER2^+$ cells. Different ligand densities were evaluated, showing that the largest cell removals were achieved with the lowest ligand densities. Furthermore, in a study of mechanical and chemical stress conditions, the MAG separation system showed robustness of sorting performances. From our previous knowledge about the scalability of the MAG magnetic beads separation, this provides promising potential for the production of therapeutic stem cells at larger scale.

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