Magnetic bead purification of antibodies from cell broth at pilot-scale

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lab on a bead
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AIM OF THE STUDY

The aim of this study was to develop an efficient mAb capture step in cell broth using magnetic beads, showing a proof of concept of suitability for industrial manufacturing.

INTRODUCTION

The increasing demand of monoclonal antibodies (mAbs) has placed a significant burden on the downstream process of mAb manufacturing. Protein A column chromatography has limitations with adsorption time and an inability to process cell broth.

Magnetic one-step batch separation eliminates centrifugation and filtration, and fuses the steps of clarification, purification, and concentration. This minimizes the process costs while providing high product purity in a single step.

RESULTS

Fast adsorption rates were obtained with an average of 88% and 97% mAb captured after 30 min and 1 hour, respectively. The presence of cells, with viabilities of 90% (run B1) or 76% (run B2), had no influence on the process.

From the 24.5 g of mAb present in the 16.25 L cell sample (run B2), a total purification yield of 86% was obtained. The mAb was eluted from the magnetic beads efficiently in a volume comparable to column chromatography. Purity and yield were also comparable to traditional protein A column chromatography (not shown).

Magnetic bead adsorption efficiency

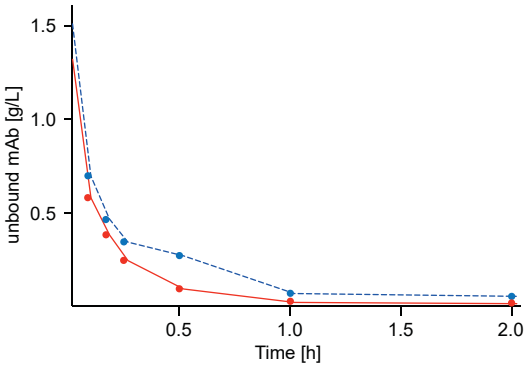
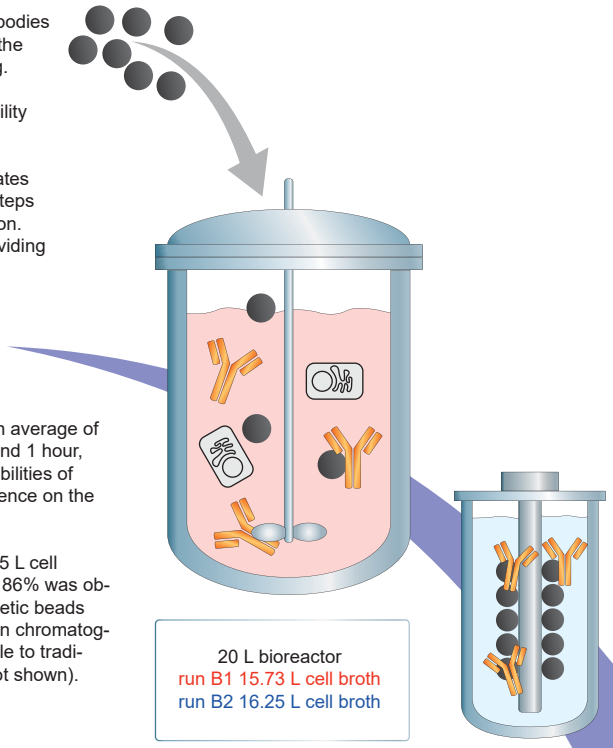


Fig. 1 Adsorption efficiency from run B1(red/solid) with mAb concentration 1.31 g/L (0.8 L beads) and run B2 (blue/dashed) with 1.51 g/L(1 L beads).



SDS-PAGE uptake analysis

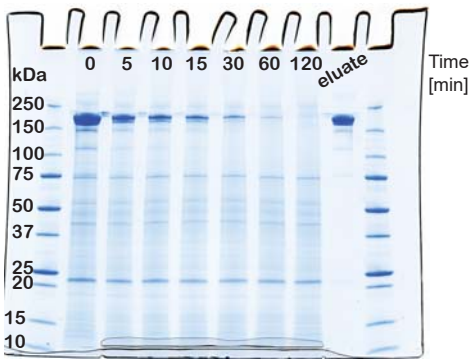


Fig. 2 Remaining mAb during adsorption phase from run B2 at different time points (non-reduced SDS-PAGE).

Magnetic bead elution profil

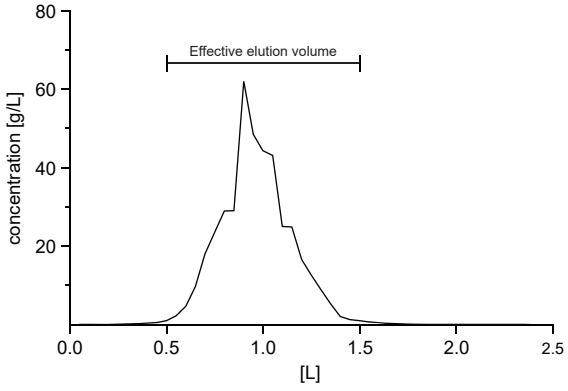


Fig. 3 Elution profile from run B2 as measured at A_{280}.

Purification efficiency

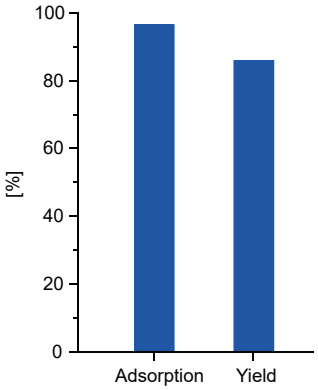


Fig. 4 Purification efficiency showing adsorption and yield percentage.

CONCLUSION

- Magnetic protein A beads were used succesfully at pilot-scale to purify mAb directly from non-clarified cellbroth
- The use of magnetic beads eliminates the need for centrifugation/filtration and shortens process time

Acknowledgements

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