Single-step purification of recombinant hepatitis B core antigen Y132A dimer from clarified Escherichia coli feedstock using a packed bed anion exchange chromatography

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ABSTRACT

Hepatitis B core antigen with the mutation of Y132A (HBcAg-Y132A) was successfully expressed in *Escherichia coli*. The mutant HBcAg-Y132A forms dimers and is unable to self-assemble into virus-like particles (VLPs). Hence, it is a potential antigen used in the antibody-responsive biosensor for the detection of anti-HBcAg in patients infected with hepatitis B virus. The aim of this study was to establish a direct purification strategy to recover HBcAg-Y132A dimer from the *E. coli* feedstock using SepFast™ Supor DEAE pre-packed column. The performance of this anion exchange chromatography was optimized in terms of the buffer composition (for adsorption and elution steps) and the mode of elution (i.e., step or gradient). The highest adsorption of HBcAg-Y132A dimer in the DEAE column was achieved with the buffer composed of 50 mM Tris-HCl (pH 8.4). The step elution using 50 mM Tris-HCl elution buffer (pH 8.4) supplemented with 1 M NaCl resulted in 1.2-fold increase in the purity of HBcAg, as compared to the gradient elution mode. In addition, it was found that the optimized 3-step elution is not directly applicable to elute the self-assembled HBcAg VLPs, as only 24.7% of the particles were recovered due to the limitation of size effect.

KEYWORDS:

Hepatitis B core antigen (HBcAg); Escherichia coli; Anion exchange chromatography; Virus-like particle