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PII: S0021-9673(15)00223-X
DOI: http://dx.doi.org/doi:10.1016/j.chroma.2015.02.013
Reference: CHROMA 356271

To appear in: *Journal of Chromatography A*

Received date: 25-11-2014
Revised date: 2-2-2015
Accepted date: 3-2-2015

Please cite this article as: A. Fulton, H. Lai, Q. Chen, C. Zhang, Purification of Monoclonal Antibody against Ebola GP1 Protein Expressed in *Nicotiana benthamiana*, *Journal of Chromatography A* (2015), http://dx.doi.org/10.1016/j.chroma.2015.02.013

Purification of Monoclonal Antibody against Ebola GP1 Protein Expressed in *Nicotiana benthamiana*

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Abstract

Monoclonal antibodies (mAbs) are one of the fastest growing drug molecules targeting the treatment of diseases ranging from arthritis, immune disorders, and infectious diseases to cancer. Due to its unique application principle, antibodies are commonly produced in large quantities. Plants, such as *Nicotiana benthamiana*, offer a unique production platform for bio-therapeutics due to their ability to produce large amounts of biomolecules in a relatively quick manner. However, purification of a target protein from plant is an arduous task due to the presence of toxic compounds in ground plant tissue and the large quantities of plant tissues to be processed. Here, a process was developed prior to the chromatographic purification of a mAb against Ebola GP1 protein expressed in *N. benthamiana.* The process includes a diafiltration step and a charged polyelectrolyte precipitation. The diafiltration step significantly improved the precipitation efficiency, reducing the usage of polyelectrolyte by more than 2000 fold while improving the native plant protein removed from 60% to 80%. The mAb can then be purified to near homogeneity judging from SDS-PAGE by either Protein A affinity chromatography or a tandem of hydrophobic interaction chromatography and a hydrophobic charge induction chromatography. The purified mAbs were shown to retain their binding specificity to irradiated Ebola virus.

Key words: Monoclonal antibody; transgenic plant; *Nicotiana benthamiana*; antibody purification; Ebola virus; transient expression.

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