Integrated process consisting of column chromatography followed by virus filtration for plasma IgG and mAb purification at constant flow rate: analysis of filtration behavior using clogging models and viral clearance tests

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Abstract

We evaluated filtration behavior and virus removal capability for a mAb and plasma IgG under constant flow rate directly following flow-through column chromatography in an integrated process. For mAb solution with quantified host cell protein (HCP) content processed in flow-through mode on in-series mixed-mode AEX and modified CEX columns connected to the Planova BioEX filter (pool-less), HCP logarithmic reduction value (LRV) of 2.3 and 93.9% protein recovery were achieved for the process. Filtration behavior for 5 to 15 mg/mL plasma IgG run at flux of 10 to 100 LMH to 100 L/m2 throughput on Planova BioEX filters showed similar behavior across the protein concentrations tested although filtration pressure increased with throughput at 50 LMH and above, indicating the suitability of lower flux processes for continuous processing. Comparing both plasma IgG and mAb filtration behavior to four clogging models showed little difference in fit among the models, but with slightly better fit to the cake filtration model. Viral clearance tested by in-line spiking X-MuLV or MVM into purified plasma IgG showed robust removal at low flux. Integrating the Planova BioEX filter into continuous processes with column chromatography can achieve efficient downstream processing with reduced footprint and process time.

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