VIRUS-LIKE PARTICLES ADSORPTION IN ANION EXCHANGE CHROMATOGRAPHY MEDIA

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Biotechnological and pharmaceutical industries have the development of modern vaccines and novel drug delivery systems as one of their main focus. At this point, Virus-Like Particles (VLPs) are key candidates once they have the ability to stimulate humoral and cellular immune responses combined with the inability to replicate or proliferate. VLPs are non-infectious self-assembled protein structures which mimic native viruses (lacking any viral genetic material). However great developments in VLPs manufacturing have already been achieved, their purification is still a complex process, usually slow and with low productivity. Accordingly, there is a demand for new purification strategies and unit operations. Anion exchange chromatography is well established and widely used in industry for the purification all sorts of biomolecules. It is already known that polymer-grafted media in form of charged hydrogels and/or chromatography beads have a very high protein binding capacity and they also bind large biomolecules such as plasmids and viruses. However, the separation mechanism of large biomolecules is still not well understood and this lack of knowledge hinders the development and optimization of the purification processes. To overcome this, our aim is to elucidate the adsorption mechanisms of VLPs, large proteins and protein superstructures into different types of anion exchange chromatography media including highly charged hydrogels and polymer-grafted media. The binding kinetics and equilibria of HIV-1 VLPs expressed in CHO cells and Influenza VLPs expressed in Baculovirus-Insect cell system have been measured for polymer grafted media to elucidate the effect of the charged polymer. Adsorption isotherms were measured in microtiter plates and kinetics in batch mode.

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