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The use of Dynamic Control in Periodic Counter Current Chromatography

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The interest for use of continuous processing in biotech downstream operations is rapidly growing, driven by the gains in productivity, product stability and reduced cost of goods. Continuous processing encompasses a range of different approaches and can relate to both single step operations as well as semi- to fully continuous processes. Improvements in equipment and hardware have now made several commercial systems for continuous chromatography available. As implementation of various strategies for continuous processing becomes more common, the demand/need for reliability in monitoring with existing hardware solutions is steadily increasing. Integration of process analytical technologies will be the determining factor for successful implementation at clinical/bioprocess scale. Periodic counter current chromatography as used by the ÄKTA™ pcc system is one technology enabling continuous processing. A key feature associated with operation of this system is the intrinsic ability supplied by the dynamic control function to automatically cope with variations related to fluctuations in feed compositions e.g. when using perfusion feed and/or changes in chromatographic media performance occur. The capacity of the embedded control strategy will be demonstrated by examples from affinity purification of monoclonal antibodies and human IgG using Protein A chromatographic media. This will include the ability of the dynamic control to adapt to varying product titer in the feed as well as varying the dynamic binding capacity of individual columns. Additionally, different applications involving both bind/elute as well as flow through modes of chromatography will be discussed.