End-to-end continuous production of complex recombinant proteins

Integration of perfusion cultivation and automated multi-step purification

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Intro

A continuous and multi-step ÄKTA was developed

No customised hardware or software

An ATF perfusion cultivation system and the modified ÄKTA was integrated

It will increase our capacity to supply research proteins

And enable us to investigate continuous production approaches in a thorough way
The whole setup – ATF reactor coupled to a modified ÄKTA
Benefits of integrated production

- Small foot print
- Low residence time from protein expressed to protein in final formulation buffer
- Low resin usage
- *Just-enough* production
- Low manual attendance need
- Continuous monitoring of the cultivation performance
A close-up of the system
Steady state, control of viable biomass

A close-up of the system
A close-up of the system
A close-up of the system

Continuous application
Integration of perfusion cultivation and automated multi-step purification

A close-up of the system
The first steps towards end-to-end processing – multi-step processing

A system enabling a multi-column setup was created

A sample was circulated from an AIEX column to an buffer-exchange column and back, showing PoC
The first steps towards end-to-end processing – continuous application

A system enabling continuous application was created

Consistent (good) protein quality was seen in eluted batches
A ÄKTApure can accomplish both continuous and multi-step processing

Feature from a continuous Explorer

Feature from a multi-step Explorer

A continuous and a multi-step Pure
A continuous campaign

A six-step process was made to run automated
All on one system
During the time one of the capture columns is loaded the other protein batch is fully purified
Every column can be targeted with e.g. step-specific buffers and e.g. gradient elution
A continuous campaign

A complete chromatogram is generated

Purified protein
A screen dump of a on-going campaign
A continuous campaign

All elution profiles can be found in the full chromatogram

Note: Gradient elution
A continuous campaign – the modified ÄKTApure

Note: Small columns
A continuous campaign – ATF reactor coupled to the modified ÄKTApure
Closing remarks

- A integrated and automated protein production process was established
- No customised hardware or software was needed
- It performs well
Thank you for your attention!
Questions? Comments?