Downstream process development of monoclonal antibodies in high-yield and high-purity by affinity and ion-exchange chromatography

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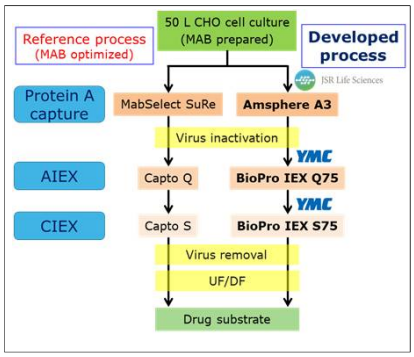
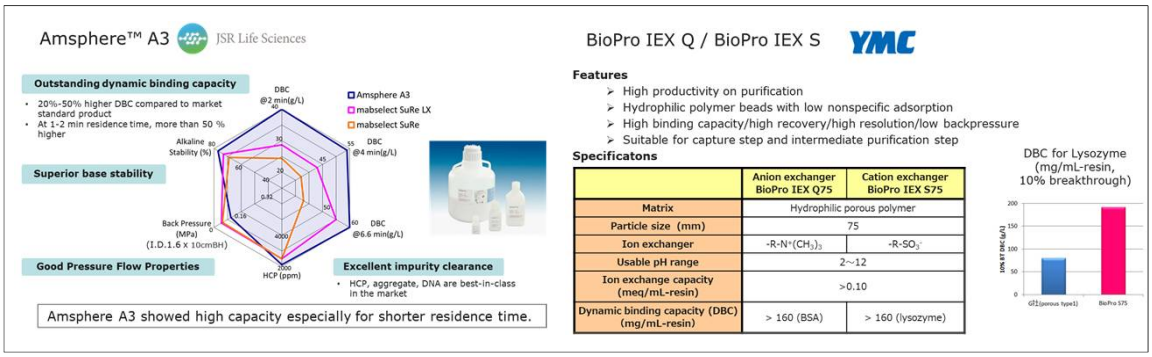
Introduction

The development of advanced downstream technology for biopharmaceutical antibody production was conducted. The verification of monoclonal antibody purification from 50 L CHO cell culture has been conducted at a GMP Facilities by 3-step process using Amsphere A3, Protein A affinity chromatography resin, and BioPro IEX S75/Q75 as ion-exchange resin. As a result, our process could obtain purified antibodies on high purity and high efficiency compared with a process using competitor's resin. In this poster, we will report the detail of investigating process parameter and scaling up. This work is supported by Manufacturing Technology Association of Biologics (MAB) which aims to establish an industrial technology platform for biopharmaceuticals as a technology research association developing next-generation production technologies for modern- and next-generation biopharmaceuticals in Japan.

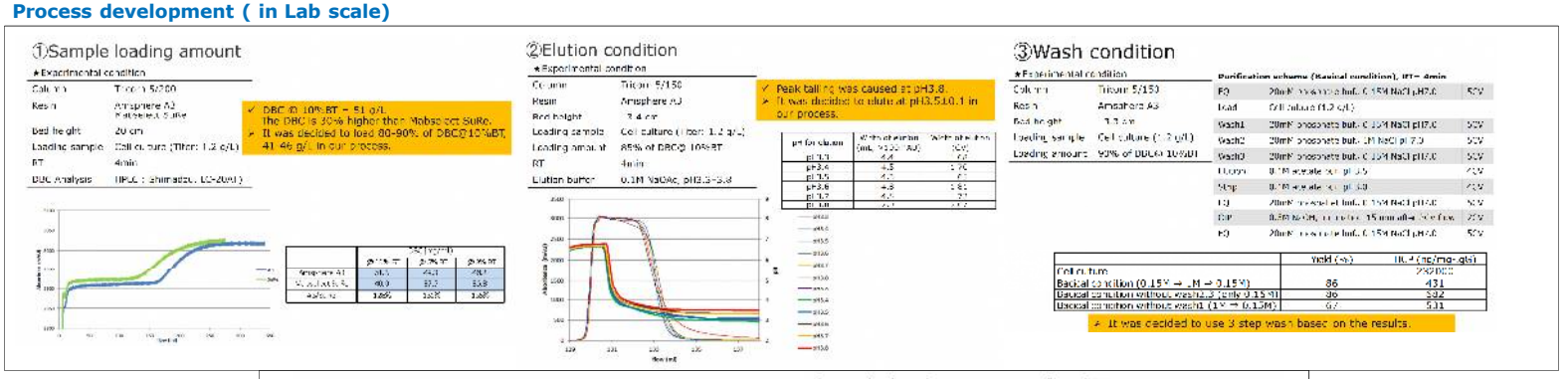
Our process flow

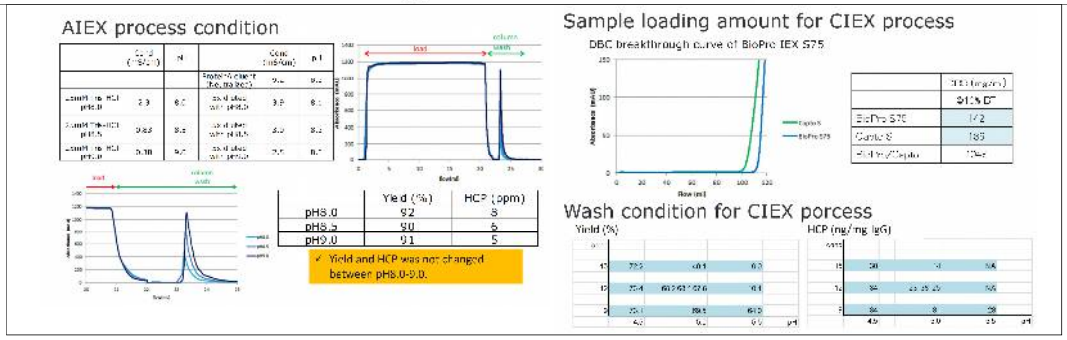


Packing material using this study



Process development (in Lab scale)





Summary of the results from our purification run (50L cell culture)

Process	Yield (each step) (%)	HCP (ng/mg-IgG)		DNA (pg/mg-IgG)		protein A (ng/mg-IgG)		Monomer (%)	
	P-3	Ref.	P-3	Ref.	P-3	Ref.	P-3	Ref.	P-3
Clarified cell culture fluid	90	127,000	-	66,900,000	-	-	-	-	-
Protein A capture	94	194	145	26,200	18,000	7.22	6.41	-	98.6
AIEX	106	4.57	0.64	1.12	<0.44	0.48	0.49	92.2	98.5
CIEX	94	3.04	0.46	1.98	<0.12	0.38	0.67	93.9	98.6
Virus removal	97	3.28	0.71	1.29	<0.25	0.27	0.35	-	-
UF/DF	102	1.47	0.64	1.18	<0.26	0.44	0.71	-	-
Drug substrate		4.9	ND*	ND*	ND*	0.50	1.10	92.6	98.7

ND*: not detectable

Conclusions

- We have successfully developed purification process.
- Our result using Amsphere A3 and BioPro IEX S/Q75 have showed it can be obtained high-quality IgG equal or greater than the process using competitor's resin.

Acknowledgement

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