MabSelect™ mild elution protein A resin

AFFINITY CHROMATOGRAPHY

MabSelect™ mild elution protein A resin (Fig 1) is designed to allow antibodies to elute at elevated pH to avoid acid-induced aggregation and thereby improving yield and process economy in the capture step. Antibodies elute at around pH 5 on MabSelect mild elution resin (vs pH 3.5 to 4 for traditional protein A chromatography resins), while keeping pool volumes low and dynamic binding capacity (DBC) high. MabSelect mild elution resin is a part of our monoclonal antibody (mAb) resin toolbox providing a range of capture and polishing resins for clinical and commercial-scale mAb production to fit the diversified antibody pipeline.

Key features of MabSelect mild elution resin:

- Allows elution at around pH 5, reducing acid-induced aggregation and yield loss of target antibody.
- Supports use in commercial-scale production, with formats for a wide range of scales, good alkaline stability and high DBC, and comes with regulatory support file.
- Specific Fc region interaction enables removal of product-related impurities from asymmetric bispecific antibodies (bsAbs) with protein A binding knocked out on one Fc region.

Effective purification for antibodies sensitive to low pH

Over the years the antibody pipeline has diversified, with a large variety of antibody-derived molecules such as bsAbs and multispecific antibodies (msAbs) as well as antibody fragments. With diversification comes additional purification and stability challenges. A one-size-fits all approach no longer suffices for purification of antibodies, so there's a need for a resin toolbox to target individual purification challenges.

Typically, a pH of 3.5 to 4 is used to elute antibodies in the protein A chromatography capture step. However, some antibody-derived molecules aggregate at this low pH—specifically, molecules like bsAbs (containing an Fc region), IgG4, and Fc fusion proteins. Aggregation can compromise monomeric purity and yield, and can place additional pressure on the following polishing steps. MabSelect mild elution resin is part of Cytiva's range of resins that help solve a wide range of purification challenges and reduce the risk of unnecessary disqualification of molecules due to insufficient purification.

Table 1 summarizes the characteristics of the MabSelect mild elution resin.

Fig 1. MabSelect mild elution resin is available in bulk and in prepacked columns.

Table 1. Main characteristics of MabSelect mild elution resin

Matrix	Highly cross-linked agarose
Ligand	Alkaline-stable protein A-derived (*E. coli*)
Ligand coupling	Single-point attachment
Coupling chemistry	Epoxy
Particle size d_{50v}*	~ 60 µm
DBC $QB_{10\%}$†	> 60 mg mAb/mL resin at 6 min residence time (RT) > 55 mg mAb/mL resin at 4 min RT
Operating flow velocity, maximum recommended‡	300 cm/h (20 cm bed height) 550 cm/h (10 cm bed height)
Operating pressure, maximum recommended§	1.5 bar (21.8 psi, 0.15 MPa)
Chemical stability	Stable in aqueous buffers commonly used in protein A chromatography
pH stability, operational¶	3 to 12
pH stability, CIP**	2 to 13.4††
Delivery conditions	20% ethanol On request 2% benzyl alcohol (BnOH)

* Median particle size of the cumulative volume distribution.
† DBC at 10% breakthrough by frontal analysis using trastuzumab at an RT of 6 min (100 cm/h) and 4 min (150 cm/h) in a HiScreen™ column at 10 cm bed height.
‡ In an AxiChrom column packed according to verified methods, in an aqueous solution with a viscosity of 1 cP at 20°C.
§ Maximum operating bed pressure to which the bed is stable at center point compression in an AxiChrom 300 column packed in water. Additional pressure from column hardware depends on the system configuration.
¶ pH range where resin can be operated without significant change in function.
** pH range where resin can be subjected to cleaning-in-place (CIP) without significant change in function.
†† pH 13.4 corresponds to 0.25 M NaOH.

Purification performance in mild elution conditions

Aggregation formation has a negative effect on yield and process economy. Keeping a high elution pH will help to avoid acid-induced aggregations. We investigated the purification performance of MabSelect mild elution resin by studying yield, pool volume, mAb aggregates, clearance of host cell protein (HCP), and leached ligand.

To determine the elution pH of an antibody, we first run the resin using a pH gradient elution at a low load to obtain sharp elution peaks. Gradient elution is a useful tool during process development to find optimal elution conditions. Once we identify the elution pH, we use a step elution to increase resolution and fulfill manufacturing requirements.

Figure 2 shows results from purification of 5 mg trastuzumab (low load) using Tricorn™ 5/50 (1 mL) columns packed with MabSelect mild elution resin or MabSelect PrismA™ resin. Elution was performed with a 20 CV pH gradient from 25 mM sodium acetate, 25 mM sodium phosphate, pH 7.0, to 25 mM sodium acetate, 25 mM sodium phosphate, pH 3.4. Typically, sodium citrate is used in a pH gradient run; however, its buffering capacity at the desired pH, i.e., pH 7, is low. Therefore, we used a phosphate-acetate mixed buffer instead. However, for a simpler elution gradient solution, sodium citrate buffer with a pH from 6.6 to 3.4 can be used. The mAb elutes from MabSelect mild elution resin at pH > 5, which is substantially higher than the elution pH of 3.9 seen for MabSelect PrismA resin.

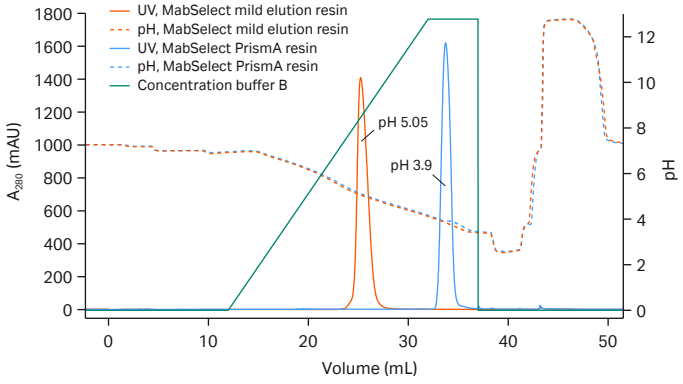

Fig 2. Gradient elution (pH 7.0 to 3.4) of a low load of trastuzumab on Tricorn 5/50 columns packed with MabSelect mild elution resin or MabSelect PrismA resin. The mAb eluted at pH > 5 when using MabSelect mild elution resin and at pH 3.9 when using MabSelect PrismA resin.

After the gradient run, we ran a step elution with the resin loaded to 80% of $QB_{10\%}$. In this experiment, we loaded 36 mL of clarified cell culture supernatant containing 2.46 g/L trastuzumab at 6 min RT on a Tricorn 5/100 (2 mL) column. The intermediate wash was performed with 20 mM sodium phosphate, 500 mM NaCl, pH 7.2. To remove salt, the column was subsequently washed with 20 mM sodium phosphate, pH 7, and the bound mAb was eluted using 50 mM sodium acetate, pH 5. This purification process yielded a 97% pure mAb (Fig 3).

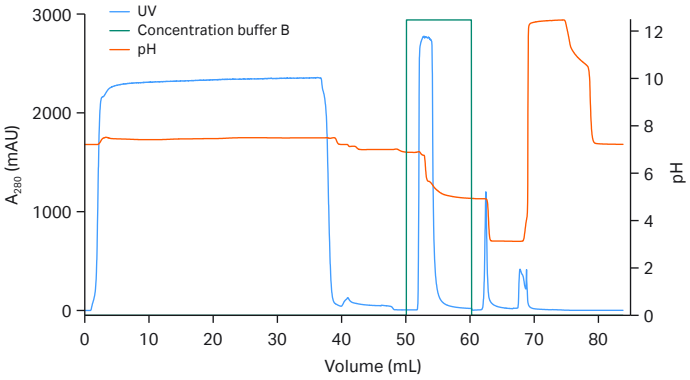

Fig 3. Purification of trastuzumab using a Tricorn 5/100 column packed with MabSelect mild elution resin and a step elution at pH 5.0. The target antibody elutes in the main peak with baseline separation and impurities elute in the strip.

The elution pool volume was < 2 column volumes (CV) and in line with other MabSelect resins. The elution pool contained < 1% aggregates, 8.3 ppm of leached ligand, and a 3-log reduction of HCP down to 95 ppm (Table 2). Ligand leakage and HCP were measured using Gyrolab technology (Gyros Protein Technologies Group). A commercial antibody (chicken anti-protein A polyclonal IgY (Ab19483 from Abcam) for protein A was used for ligand leakage, and CHO-HCP kits were used for HCP analysis.

Table 2. HCP, leached ligand, and mAb aggregates in the elution pool in purification of mAb from cell culture supernatant using MabSelect mild elution resin

Load	80% of DBC $QB_{10\%}$ (89 mg mAb)
Yield (%)	97
Pool volume (CV)	1.8
Pool concentration (mg/mL)	23.4
Aggregates (%)	0.8
HCP* (ppm)	95
Protein A (ppm)	8.3

*HCP at start 88 734 ppm

HCP reduction

The low-pH elution used in classical protein A resin chromatography can cause co-elution of HCP with the target molecule. Hence, we explored whether MabSelect mild elution resin would provide a lower concentration of HCP in the elution pool compared to a more conventional protein A resin. We measured HCP in elution pools after purification with either MabSelect mild elution or MabSelect PrismA resin. Resins were packed into Tricorn 5/100 columns and clarified cell culture supernatant was loaded onto the columns to 80% of $QB_{10\%}$. Chromatography and HCP analyses were performed as described earlier, except that the elution pH of MabSelect PrismA resin was 3.5. As we expected,

yields were similar between the resins (data not shown), but the concentration of HCP in the sample purified with MabSelect mild elution resin was significantly lower than that of the MabSelect PrismA resin elution sample (Fig 4). This indicates a more effective HCP removal with MabSelect mild elution resin.

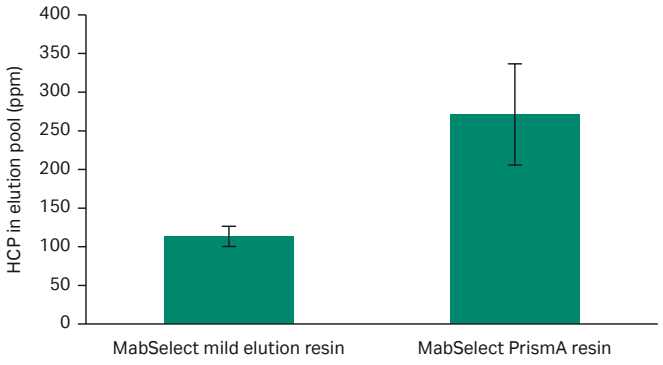

Fig 4. The remaining HCP (ppm) in elution pool. The concentration of HCP in the loaded feed was 117 443 ppm. Data presented as mean ± SD from triplicate runs. Statistical significance between the two resins was evaluated using a Tukey HSD (P = 0.015).

Viral clearance

We tested the viral clearance efficiency of MabSelect mild elution resin with two representative viruses: minute virus of mice (MVM) and retrovirus-like particle (RVLP). We spiked clarified cell culture supernatant containing trastuzumab with 1 × 10^{10} MVM virus/mL and 1 × 10^{8} RVLP virus/mL and applied to a HiScale 10/200 column. Purification was performed using the standard method for MabSelect mild elution resin as described above. Virus concentrations in the start sample and in the elution pool were quantitated using kits from Cygnus Technologies (MockV MVM kit, item number M219; MockV RVLP kit, item number M230) according to the manufacturer's protocols. The $\log_{10}$ reduction value was 5.1 for the MVM virus and 4.6 for the RVLP virus. In comparison, traditional protein A resins, eluted at lower pH, typically achieve 2–3 $\log_{10}$ reduction for these viruses (data not shown).

Specific interaction for the Fc region

MabSelect mild elution resin has a specific interaction to the Fc region of human IgGs (subclasses 1, 2 and 4), with no secondary interaction with the VH3 region. We demonstrated the selectivity of MabSelect mild elution resin by loading 5 mg each of a full-size mAb (trastuzumab), a trastuzumab Fab domain, and a VH3-containing VHH antibody onto a Tricorn 5/50 column packed with MabSelect mild elution resin.

The experiment showed that none of the antibody fragments, which lack the Fc region, bound to the MabSelect mild elution resin and instead passed through the column during the sample application phase. The full-size mAb containing the Fc region bound totally and was subsequently eluted completely using 50 mM sodium acetate, pH 5.0. Furthermore, we observed no elution peaks for the fragments (Fig 5).

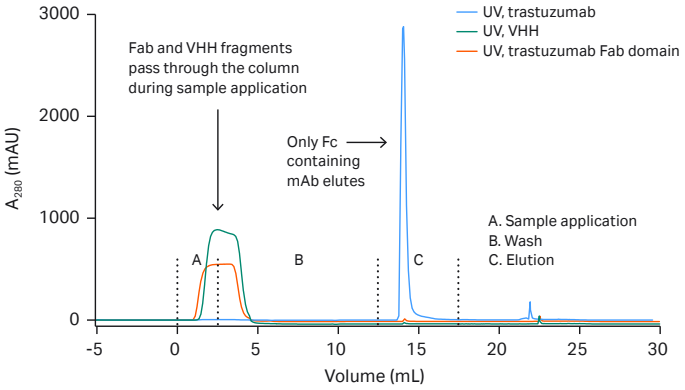

Fig 5. Chromatograms for full-sized trastuzumab, a trastuzumab Fab domain, and a VH3-containing VHH antibody purified with MabSelect mild elution resin. All fragments passed through the column in the flowthrough. The full-sized trastuzumab was collected in the elution peak.

High elution pH across different mAb classes

We purified three different mAbs—trastuzumab (IgG1), erenumab (IgG2), and nivolumab (IgG4)—to investigate their elution pH on MabSelect mild elution resin. As Figure 6 shows, the elution pH was high for all three mAbs, ranging from 5.25 (for IgG2) to 4.8 (for IgG4).

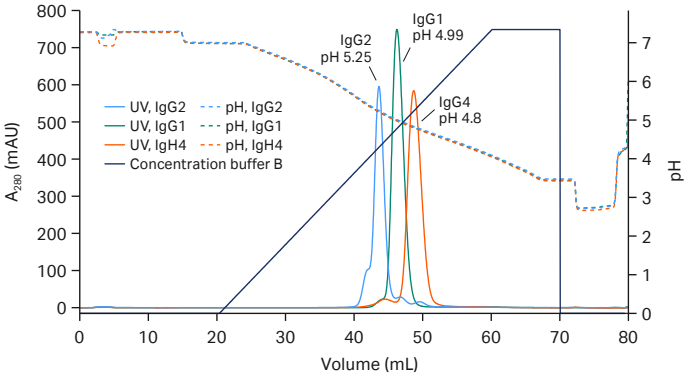

Fig 6. Chromatograms show a pH gradient elution (pH 7.0 to pH 3.4) for three different mAbs, trastuzumab (IgG1), erenumab (IgG2), and nivolumab (IgG4) using MabSelect mild elution resin.

For these three mAbs we also performed a step elution (chromatogram not shown) and investigated the effect of elution pH on pool volume and yield (Fig 7). It's important to note that when the elution pH is too high for your molecule, the result can be larger pool volumes and a decrease in yield. It is therefore essential to optimize elution pH for your subsequent downstream steps and balance pool volume against yield. Increased elution volumes lead to less-concentrated samples and larger process volumes, which can have a negative effect on the production facility.

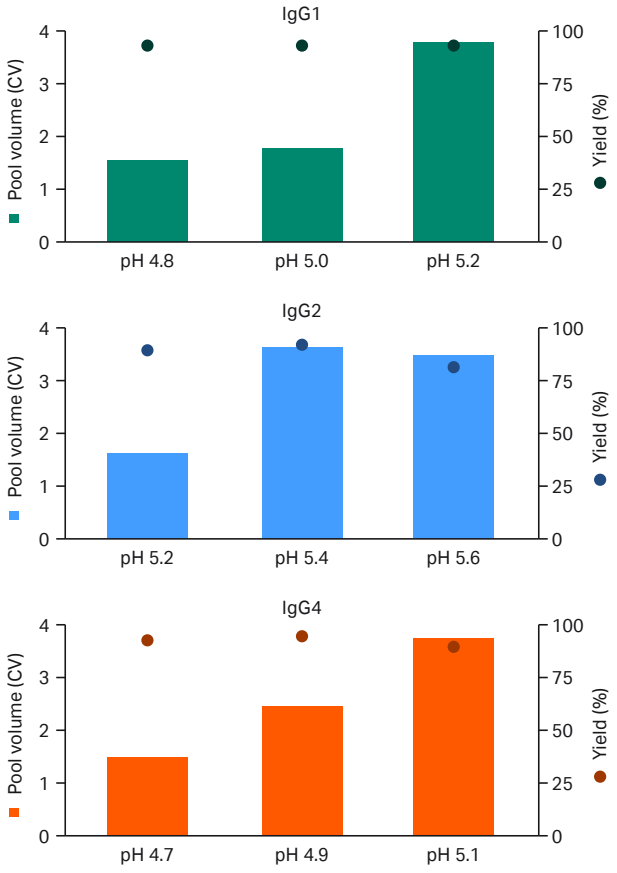

Fig 7. Pool volumes measured in CV (left axis) and yields (right axis) for three human IgG subclass molecules. We used a step elution at different pH values.

Agarose base matrix provides excellent pressure-flow properties

MabSelect mild elution resin is based on a high-flow agarose base matrix with a median particle (bead) size of 60 µm with excellent flow properties. The working flow velocity for the resin is up to 300 cm/h at 20 cm bed height in large-scale columns. Figure 8 shows pressure-flow curves for an agarose base matrix with a median (bead) size of 60 µm enabling flow velocities as high as 300 cm/h, as verified in large BioProcess™ columns.

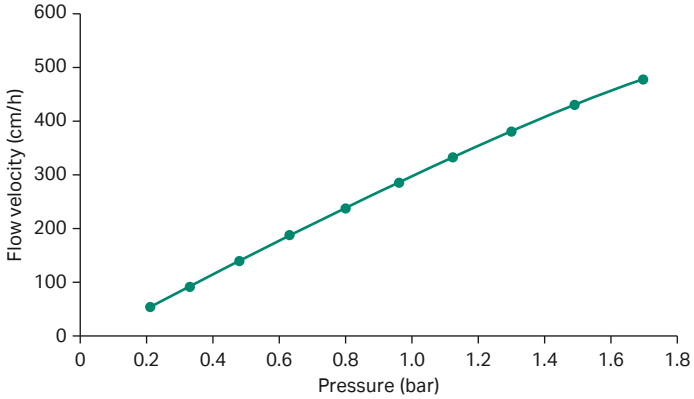

Fig 8. Pressure-flow curve for an agarose base matrix with a median (bead) size of 60 µm packed in a AxiChrom 300 column to a 20 cm bed height, generated at a temperature of 20°C. Recommended maximum operating flow velocity is 300 cm/h.

High DBC benefits process economy

High DBC allows high mass throughput of processed antibody per resin volume unit. It also benefits productivity and process economy. We evaluated the DBC of MabSelect mild elution resin for a mAb (trastuzumab) at different RT at 10% breakthrough ($QB_{10\%}$) by frontal analyses using ÄKTA pure™ 25 system with UNICORN™ software. We used HiScreen columns with a 10 cm bed height.

MabSelect mild elution resin showed lower DBC for this mAb than MabSelect PrismA resin (Fig 9). For example, at 6 min RT, MabSelect mild elution resin and MabSelect PrismA resin showed a DBC of 60 g/L and 72 g/L, respectively. However, for pH-sensitive molecules, the benefits of higher elution pH may be more important.

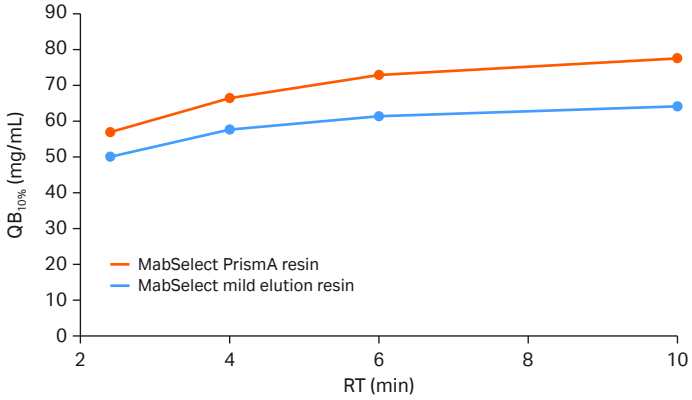

Fig 9. DBC at $QB_{10\%}$ for MabSelect mild elution and MabSelect PrismA resins at different RT using trastuzumab.

Alkaline stability for robust resin CIP

High DBC is important throughout the resin's lifetime—not just at the beginning. For high productivity, the resin needs to maintain its DBC over many cycles, as well as withstand harsh cleaning conditions to reduce risk for bioburden incidents and carryover between batches.

We evaluated the alkaline stability of MabSelect mild elution resin in an accelerated study, a repeated buffer cycling study, and in a lifetime study.

Accelerated study

We evaluated alkaline stability of MabSelect mild elution resin through an accelerated study (Fig 10) with 0.1 M, 0.25 M, and 0.5 M NaOH. In this study, the resin was packed into Tricorn 5/50 (1 mL) columns and exposed to 0.1 M, 0.25 M, or 0.5 M NaOH for 4 h (corresponding to 16 CIP cycles of 15 min contact time per cycle). DBC was measured with purified trastuzumab at the 16th cycle, and the relative remaining DBC was calculated by comparing the DBC after NaOH exposure to the initial DBC (at 0 cycles, no NaOH treatment). This process was repeated six times, corresponding to a total of 96 cycles. As shown in Figure 10, after 96 cycles, the relative remaining DBC was 99% for 0.1 M NaOH, 94% for 0.25 M NaOH, and 86% for 0.5 M NaOH.

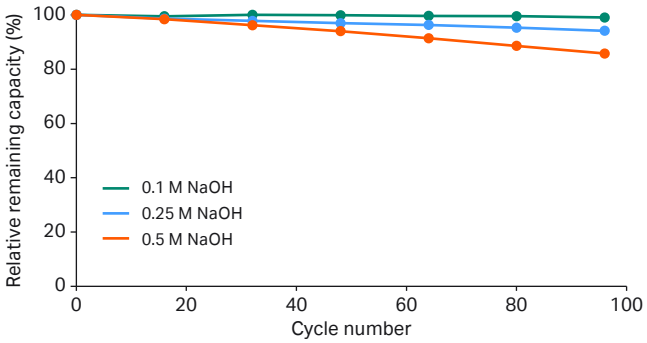

Fig 10. Relative remaining binding capacity ($QB_{10\%}$) of MabSelect mild elution resin for mAb (trastuzumab) in an accelerated alkaline stability study. After 96 cycles, the relative remaining DBC was 99% for 0.1 M NaOH, 94% for 0.25 M NaOH, and 86% for 0.5 M NaOH.

Buffer cycling study

In the repeated buffer cycling study (Fig 11), we ran all steps in the purification process (using a 1 mL Tricorn 5/50 column) with buffer instead of antibody feed for 11 cycles, then used purified trastuzumab to measure relative remaining DBC at every 12th cycle. We repeated this 12-cycle process 17 times, for a total of 204 cycles. For the buffer cycling study, we loaded 2 CV of 20 mM sodium phosphate, 150 mM NaCl, pH 7.4; 5 CV of 50 mM sodium acetate, pH 5.0; 1.5 CV of 100 mM acetic acid; 3 CV of 0.25 M NaOH (contact time 15 min/cycle), and re-equilibrated with 6 CV of 20 mM sodium phosphate, 150 mM NaCl pH 7.4. As shown in Figure 11, at 96 cycles, the remaining DBC was about 88%, and after 200 cycles, the remaining DBC was about 80%, showing good alkaline stability.

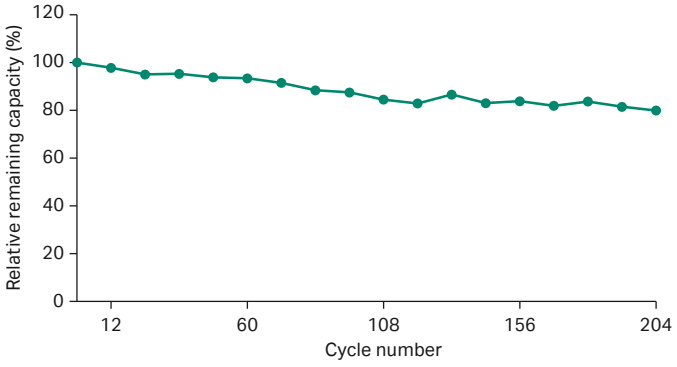

Fig 11. Relative remaining binding capacity ($QB_{10\%}$) of MabSelect mild elution resin for mAb (trastuzumab) after 204 repeated cycles including 15 min CIP cycle with 0.25 M NaOH. After 200 cycles, the remaining DBC was about 80%.

Lifetime study

In the lifetime study (Figs 12 and 13), we evaluated both DBC and yield, pool volume, and concentration over 100 cycles of loading, elution, strip, and CIP. We used a Tricorn 5/100 (2 mL) column packed with MabSelect mild elution resin, loaded with a cell culture supernatant containing 2.46 g/L mAb (trastuzumab) at 6 min RT up to 80% of DBC at $QB_{10\%}$. Bound mAb was eluted in 50 mM sodium acetate, pH 5.0, followed by a strip of the column with 100 mM acetic acid, pH 2.9. CIP was performed with 0.25 M NaOH (15 min contact time) after each elution phase. We determined DBC at $QB_{10\%}$ at every 10th cycle by frontal analysis using an ÄKTA pure 25 chromatography system with UNICORN software.

As seen in Figure 12, the relative remaining DBC after 100 purification cycles was 82%. The lifetime study also demonstrated very stable yield, elution pool volume, and pool concentration (Fig 13). The pool volume was less than 2 CV, and in line with that observed with other MabSelect resins. Aggregate concentration in the elution pools was consistently low (< 1%). Concentrations of HCP and leached protein A were stable and low with no significant trends, comparable to results obtained with the MabSelect PrismA resin (see data file).

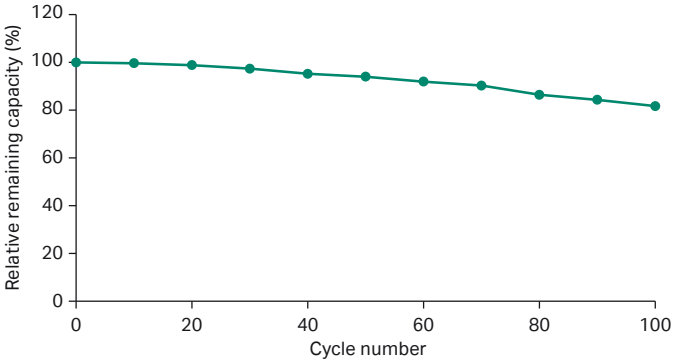

Fig 12. Relative remaining binding capacity ($QB_{10\%}$) of MabSelect mild elution resin for trastuzumab. After 100 repeated purification cycles, including 15 min CIP cycle with 0.25 M NaOH, the remaining DBC was 82%.

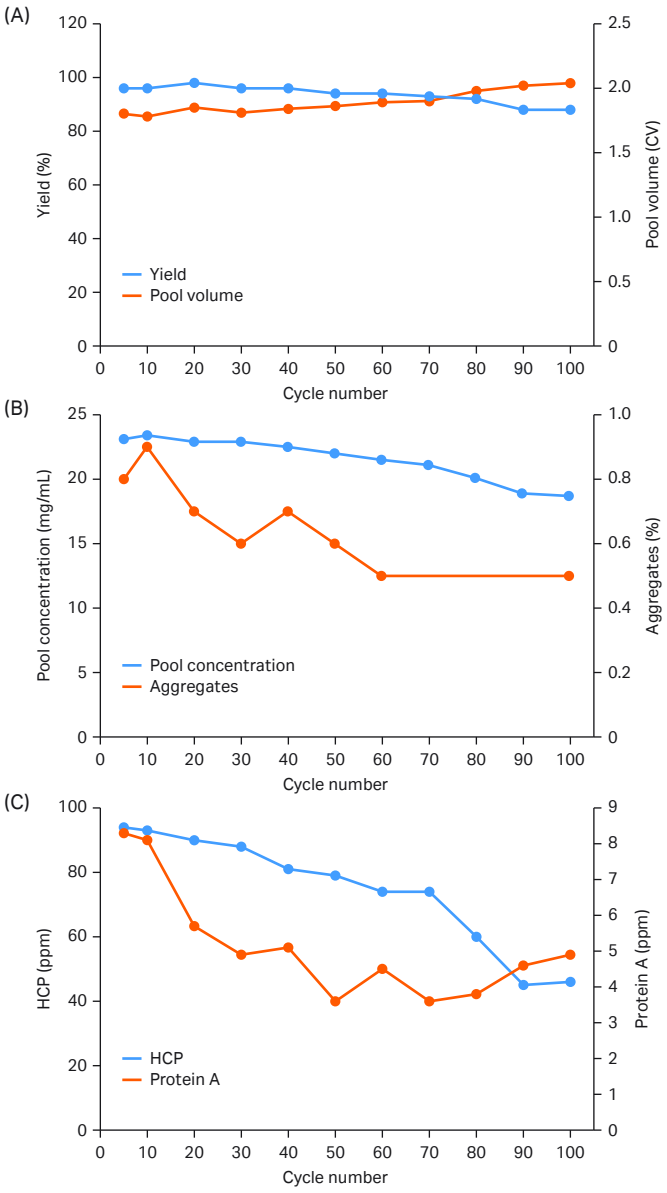

Fig 13. Purification performance of MabSelect mild elution resin obtained from a lifetime study of 100 cycles mAb purification from cell culture supernatant containing trastuzumab. The study demonstrated (A) stable yield and elution pool volume; (B) stable pool concentration and low levels of aggregates; and (C) low HCP and low protein A leakage. Each purification cycle includes 15 min CIP with 0.25 M NaOH.

Separation of bsAb and product-related impurities

During cell culture of asymmetric bsAbs, product-related impurities such as homodimers, half antibodies, and free light chains can be formed. Aggregation is common during processing of bsAbs. The similarities between the target molecule and the impurities present extra challenges for downstream processes, both in the capture and polishing steps. MabSelect mild elution resin and its selectivity for the Fc-region enables separation of product-related impurities in the capture step for asymmetric bsAbs where only one of the Fc chains includes the traditional protein A-binding Fc-motif (FcA, Fig 14).

We evaluated the potential of MabSelect mild elution resin to separate an asymmetric bsAb from product-related impurities in a cell culture supernatant containing transiently expressed heterodimeric bsAb (emicizumab), and its two mispaired homodimeric species.

Emicuzimab is comprised of two types of Fc-regions: FcA and FcB, where the FcB has a mutation that prevents protein A binding. Because MabSelect mild elution resin specifically binds to FcA but not to FcB, the FcB:FcB homodimer should not interact and should go to the flowthrough. The FcA:FcA homodimer will bind with higher avidity than the correctly paired FcA:FcB heterodimer and therefore should elute at a lower pH. Using a gradient or two-step elution with different pH values make it feasible to separate FcA:FcB from FcA:FcA. In a production scenario, the bsAb would typically be eluted during a step elution, and the unwanted homodimer separated during the strip of the column.

To evaluate binding and separation, we loaded approximately 5 mg of bsAb in cell culture supernatant onto a Tricorn 5/100 (2 mL) column packed with MabSelect mild elution resin. We performed a 20 CV pH gradient from 25 mM sodium acetate, 25 mM sodium phosphate, pH 7.0, to 25 mM sodium acetate, 25 mM sodium phosphate, pH 3.4. As seen in Figure 15, homodimer FcB:FcB did not bind to the column and was recovered in the flowthrough. Heterodimeric bsAb FcA:FcB and mispaired FcA:FcA were bound to the column but eluted as two distinct peaks with good resolution, as expected. The heterodimer and homodimer eluted at pH 5.0 and pH 4.6, respectively. The species in the flowthrough and in the collected peaks were confirmed using liquid chromatography-mass spectrometry (LC-MS) analysis (data not shown).

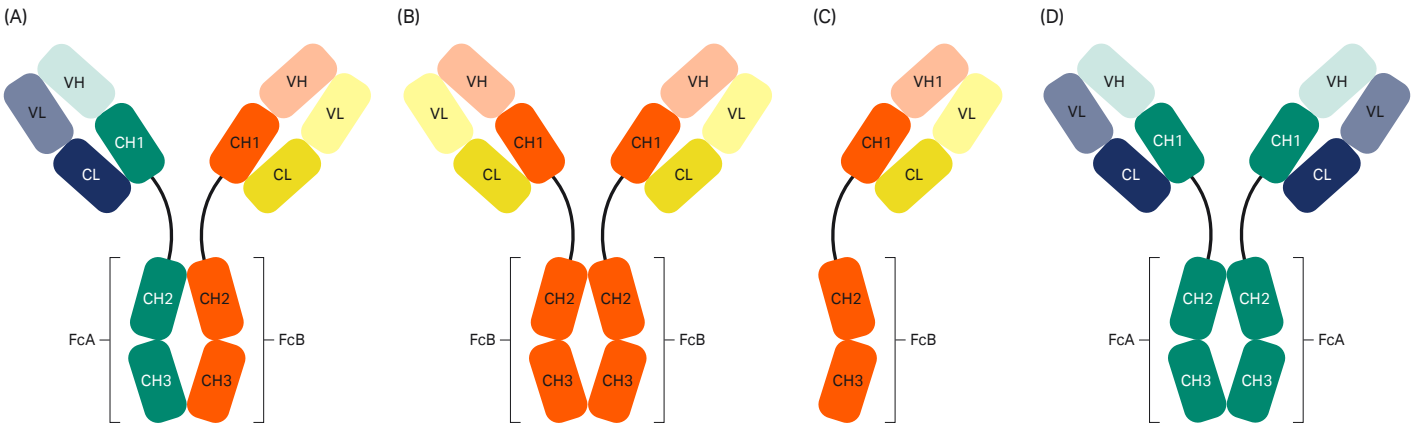

Fig 14. bsAb interaction with MabSelect mild elution resin. (A) The target is an asymmetric bsAb with two types of Fc regions (FcA and FcB). Only the FcA region interacts with protein A. (B,C) Product-related impurities that contain only FcB will end up in the flowthrough. (D) Homodimers with FcA on both heavy chains will elute later than the target bsAb (A) due to avidity effects.

The pH differential between the hetero- and homodimers is about 0.5 pH units, so a baseline separation with gradient elution is not possible. However, a step elution under optimized conditions can facilitate baseline separation.

We demonstrate an efficient separation of bsAb with high load and step elution in Figure 16. In this experiment, we loaded 36 mg bsAb in cell culture supernatant onto a Tricorn 5/100 column packed with MabSelect mild elution resin. Followed by sample application, the column was washed with 20 mM sodium phosphate, 500 mM NaCl, pH 7.2 and then 20 mM sodium phosphate, pH 7. The elution of the heterodimer was performed with 50 mM sodium acetate at pH 5.0, based on results from the gradient elution experiment (Fig 15). The homodimer was eluted at the subsequent strip step, which used 100 mM acetic acid. The bsAb heterodimer was well separated even at this high load (Fig 16), demonstrating the high binding capacity of the resin for bsAbs without compromising resolution. Collected fractions were subjected to LC-MS analyses to confirm the respective species (data not shown).

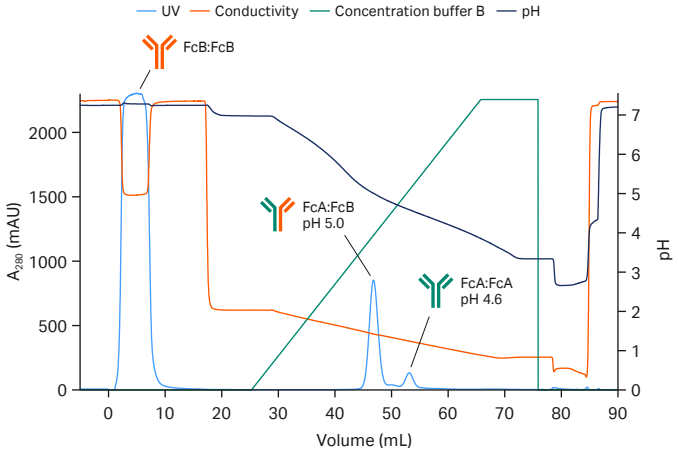

Fig 15. Separation of heterodimer bsAb (emicuzimab) from product-related impurities on a Tricorn 5/100 (2 mL) column packed with MabSelect mild elution resin in a low-load run.

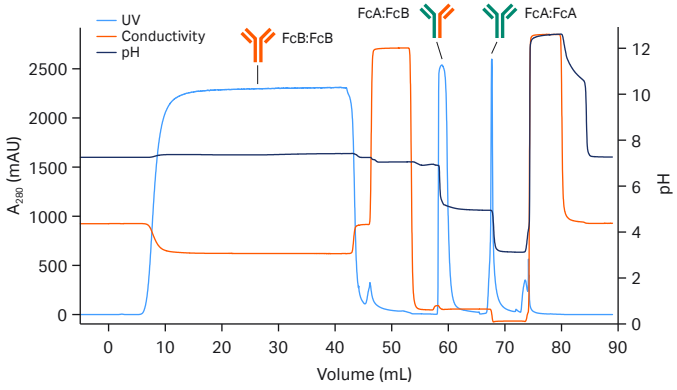

Fig 16. Separation of heterodimer bispecific antibody from product-related impurities with step elution in a high-load run.

How to use MabSelect mild elution resin

Formats

MabSelect mild elution resin will be available as bulk resin in units of 25 mL, 200 mL, 1 L, 5 L, and 10 L. The resin will also be available in prepacked column formats such as HiTrap™ columns (1 and 5 mL), HiScreen columns, and on request in production-scale ReadyToProcess™ columns. These formats enable use from lab scale to commercial scale manufacturing.

Determining ligand leakage

During mAb purification with a protein affinity ligand, ligand leakage can occur. To control the production process and the amount of ligand contaminant in the final drug product, ligand leakage of the MabSelect mild elution can be measured using immunoassay analytical techniques. Protein A ligand leakage can be measured using Gyrolab technology (Gyros Protein Technologies Group) together with a commercial antibody (such as chicken anti-protein A polyclonal IgY [Ab19483 from Abcam]).

The ligand is available under non-transferable limited license for analytical purposes for protein A leakage qualification. Contact us for further information.

Screening protocol for elution pH

The protocol in Table 3 is a starting point for screening to determine suitable elution conditions for the target molecule, using a low sample load, for example, 5 to 10 mg mAb per mL of resin. A low load will save on target protein during optimization and provide sharp peaks.

Table 3. pH gradient elution protocol

Step	Buffer	Length (CV)	RT (min)
Equilibration	20 mM sodium phosphate, 150 mM NaCl, pH 7.4	5	4
Sample application	Clarified cell culture supernatant or purified sample diluted in equilibration buffer	5–10 mg/mL resin	6
Column wash	20 mM sodium phosphate, pH 7.0	5	4
Elution*	Buffer A: 25 mM sodium phosphate, 25 mM sodium acetate, pH 7.0 Buffer B: 25 mM sodium phosphate, 25 mM sodium acetate, pH 3.4	10–20 (linear gradient elution 0% to 100% B)	6
Strip	0.1 M acetic acid	2	4
Column CIP	0.25 M NaOH	3	5
Re-equilibration	20 mM sodium phosphate, 150 mM NaCl, pH 7.4	5	4

*For a simpler elution gradient solution, sodium citrate buffer with a pH from 6.6 to 3.4 can be used.

Read the elution pH from the chromatogram at apex of the elution peak(s).

In the step elution run, use a high load that is suitable for your specific application and molecule (about 70% to 80% of $QB_{10\%}$). Evaluate yield, elution pool volume, concentration, aggregate concentrations, HCP and leached protein A to verify an efficient purification step.

Resin storage

MabSelect mild elution resin is delivered in 20% ethanol. Store unused resin in its container between 2°C and 8°C. Ensure that the screw top is fully tightened. Equilibrate packed columns in buffer containing 20% ethanol or 2% benzyl alcohol to prevent microbial growth. After storage, equilibrate with starting buffer and perform a blank run, including CIP, before use.

mAb toolbox from Cytiva

Target molecule, impurity profile, suitable process conditions, process volumes, number of batches, and cleaning protocols influence which capture chromatography resin will be most efficient and productive in your application. Figure 17 shows different protein A resins and how they interact with an antibody.

The protein A affinity capture step in antibody purification is followed by one or two polishing steps to remove impurities, see our website for the full range of Capto™ resin solutions for chromatography polishing.

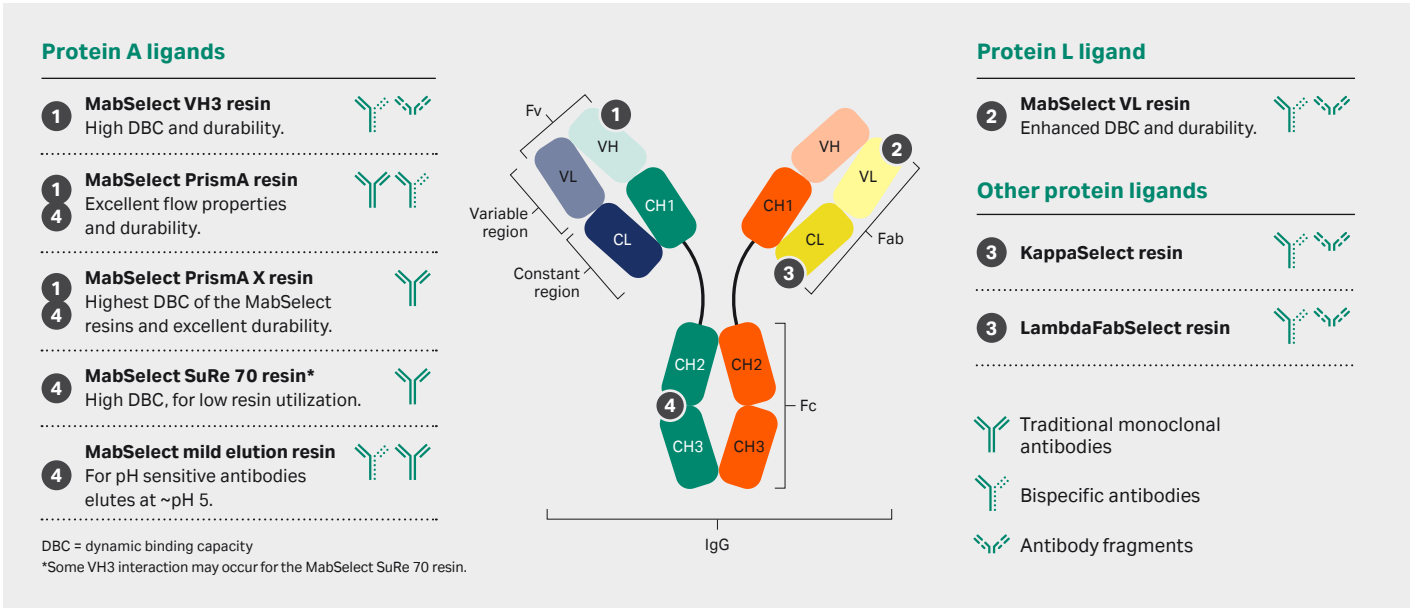

Fig 17. Select capture resin based on the domains of your antibody variant and the product-related impurities for efficient separation. For traditional mAbs select based on productivity for your specific process scenario (batch volumes, number of batches, titer etc.).

Supply-chain stability

We recognize the critical importance of reliable and secure supply to our customers. We are rapidly expanding our robust manufacturing capacity and maintaining open communication with customers to support supply resilience.

We recommend that you work closely with your Cytiva representative to forecast demand to support our production planning and manufacturing operations.

Find out more about how we support secure supply to the biopharma industry.

Support and training

MabSelect mild elution resin belongs to the BioProcess family of products developed and supported for large-scale manufacture of biopharmaceuticals. This support includes validated manufacturing methods, secure long-term resin supply, and regulatory support files (RSF) to assist process validation and submission to regulatory authorities. In addition, Fast Trak™ training and education provide high-level, hands-on training in key aspects of process development and manufacturing.

You can also access Cytiva online learning to build your skills and continue your education.

Ordering information

Product	Size	Product code
HiTrap MabSelect mild elution column	1 × 1 mL	17542351
HiTrap MabSelect mild elution column	5 × 1 mL	17542352
HiTrap MabSelect mild elution column	1 × 5 mL	17542353
HiTrap MabSelect mild elution column	5 × 5 mL	17542354
HiScreen MabSelect mild elution column	1 × 4.7 mL	17542315
MabSelect mild elution resin	25 mL	17542301
MabSelect mild elution resin	200 mL	17542302
MabSelect mild elution resin	1 L	17542303
MabSelect mild elution resin	5 L	17542304
MabSelect mild elution resin	10 L	17542305
ReadyToProcess MabSelect mild elution columns	Contact us for sizes and product codes	

Please contact us to request samples of MabSelect mild elution resins.

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cytiva.com

For local office contact information, visit cytiva.com/contact

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