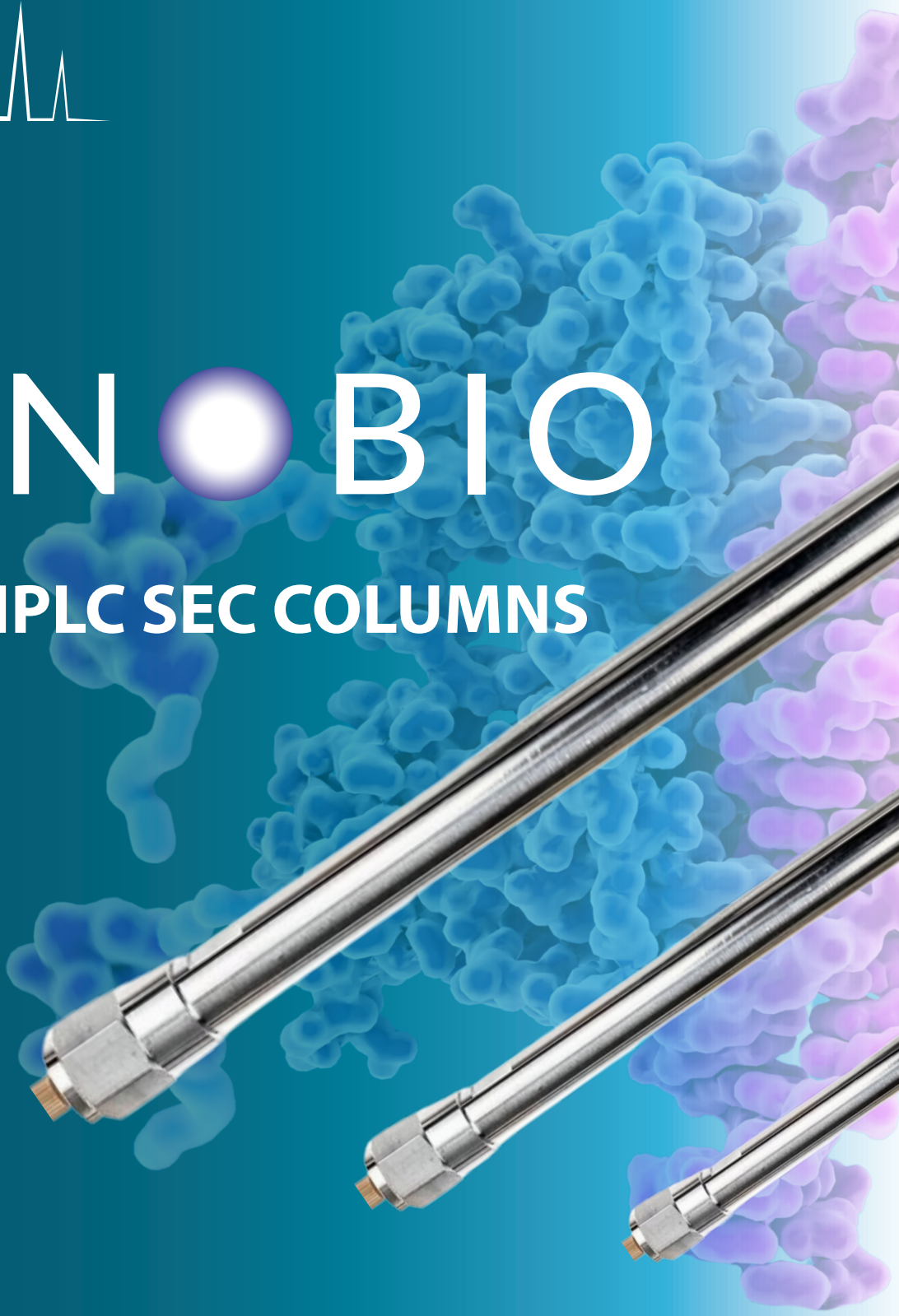
macmod

MONOBIO

UHPLC & HPLC SEC COLUMNS



Powered By

MONODISPERSE PARTICLE TECHNOLOGY

MONOBIO

Powered By Monodisperse Particle Technology

SEC Columns for UHPLC & HPLC Applications

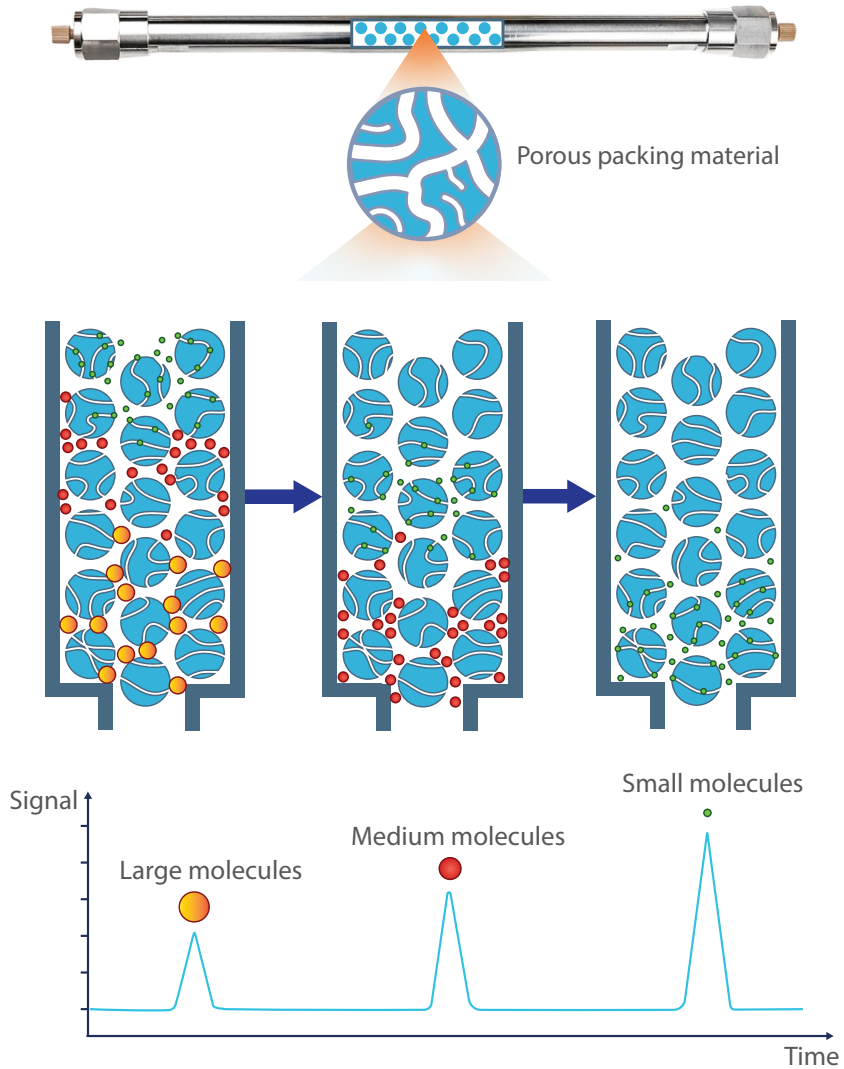
TABLE OF CONTENTS

INTRODUCTION TO SEC

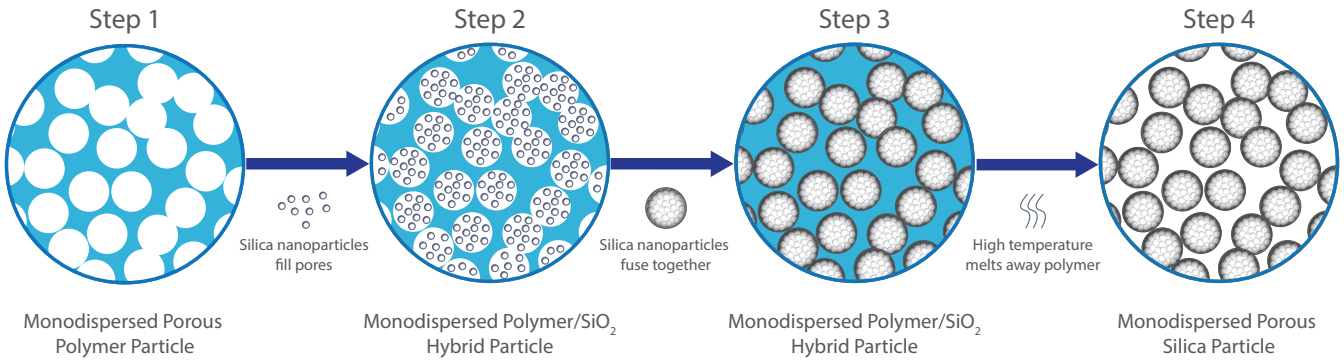
What is SEC?

- Size exclusion chromatography (SEC) is a chromatographic method that separates molecules in a solution based on their size or hydrodynamic volume.
- In SEC mode, a column is packed with a stationary phase containing a porous packing material with a hydrophilic proprietary diol bonded phase and discrete pore size. The sample is then injected onto this column.
- Larger molecules cannot enter the pores and will elute first, while smaller molecules that can access the pores are retained longer on the column.

Target Analytes: Proteins, Enzymes, Antibodies, Nucelic Acids, and Industrial Polymers



INNOVATING AN SEC PARTICLE PLATFORM BASED ON MONODISPERSE SILICA PARTICLES



Step 1: Form monodispersed fully porous spherical polymer

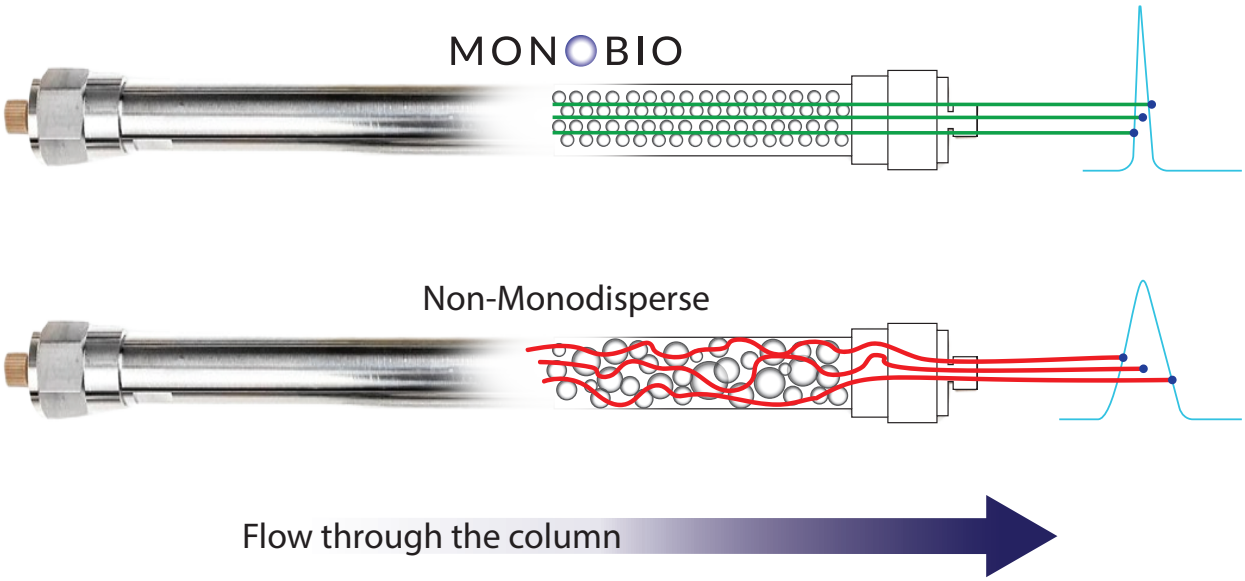
Step 2: Pores of monodispersed polymer particles are filled with silica

Step 3: Silica nanoparticles fuse together to form silica/polymer

Step 4: Augment the newly formed hybrid particle to remove the polymeric residual particles while stabilizing silica particle substrate to create a monodispersed porous silica particle

INHERENT BENEFITS OF A MONODISPERSE SEC PLATFORM

- Provides high efficiency (N), excellent mechanical strength, and high pore volume, which delivers high Rs
- Advanced column chemistry throughout particle size and pore size range minimizes secondary interactions
- Inherently delivers excellent batch to batch reproducibility as well as excellent robustness
- Shedding of new particle template is limited from optimized bonding coverage



PRODUCT SPECIFICATIONS

Pore Size (Å)	Bonded Phase	Particle Composition	Particle Size (µm)	pH Range	Application Area
120	DIOL- Proprietary (DIP)	Monodisperse Fully Porous Silica Particles	1.8 3.0 5.0	2-8	Small Molecule Drugs Heparin Peptides Glycans Small Oligonucleotides
150	DIOL- Proprietary (DIP)	Monodisperse Fully Porous Silica Particles	1.8 3.0 5.0	2-8	Small Molecule Drugs Heparin Peptides Glycans Small Oligonucleotides Small Proteins
300	DIOL- Proprietary (DIP)	Monodisperse Fully Porous Silica Particles	1.8 3.0 5.0	2-8	mAbs and Aggregates
500	DIOL- Proprietary (DIP)	Monodisperse Fully Porous Silica Particles	1.8 3.0 5.0	2-8	mAbs High-order Aggregates Large Proteins Small DNA/RNA
700	DIOL- Proprietary (DIP)	Monodisperse Fully Porous Silica Particles	3.0	2-8	AAV (adeno-associated viruses)
1000	DIOL- Proprietary (DIP)	Monodisperse Fully Porous Silica Particles	3.0	2-8	Aggregates and Fragments in mRNAs and Plasmids Circular RNA Rhinoviruses Adenoviruses Lentiviruses
2000	DIOL- Proprietary (DIP)	Monodisperse Fully Porous Silica Particles	3.0	2-8	Aggregates and Fragments in mRNAs and Plasmids Circular RNA Rhinoviruses Adenoviruses Lentiviruses

120 Å MONODISPERSE SEC COLUMNS

Designed for the separation by hydrodynamic volume (size) of small molecule drugs, heparin, peptides, glycans and small oligonucleotide fragments

Ceftriaxone Sodium

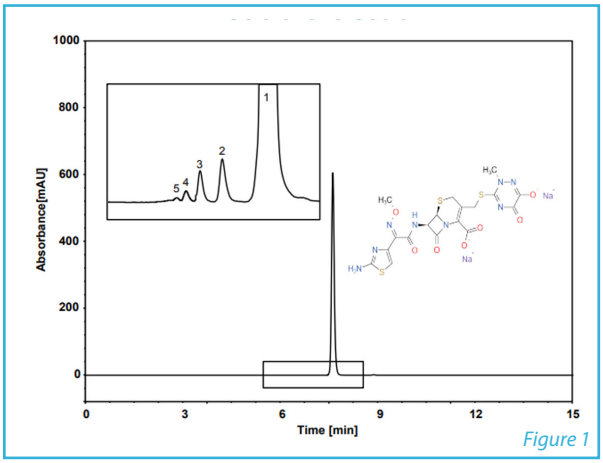


Figure 1

Column:	MBSECDIP127830
Description:	MONOBIO SEC DIP 120 Å, 5.0 µm, 7.8 x 300 mm Monodisperse HPLC Column
Mobile Phase:	5 mM phosphate buffer, pH 7.0
Flow Rate:	1.0 ml/min
Temperature:	30°C
Injection:	2 µl
Detection:	UV 231 nm
Analyte ID:	1. Ceftriaxone 2-5. Polymers of Ceftriaxone

Cefmetazole Sodium

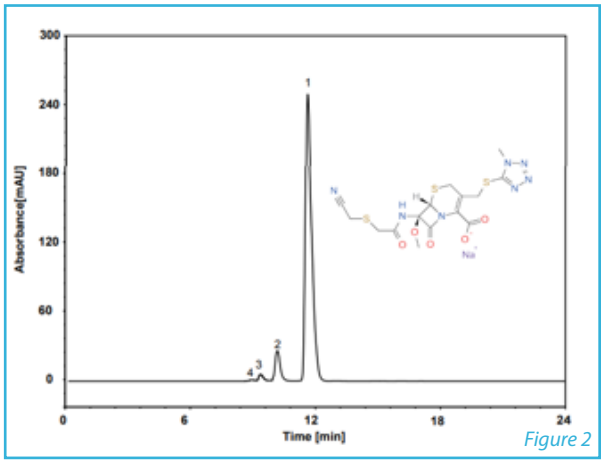


Figure 2

Column:	MBSECDIP127830
Description:	MONOBIO SEC DIP 120 Å, 5.0 µm, 7.8 x 300 mm Monodisperse HPLC Column
Mobile Phase:	90/10 v/v 5 mM phosphate buffer, pH 7.0/ACN
Flow Rate:	0.6 ml/min
Temperature:	25°C
Injection:	10 µl
Detection:	UV 254 nm
Analyte ID:	1. Cefmetazole 2-5. Polymers of Cefmetazole

Ceftriaxone and cefmetazole belong to cephalosporins which are widely used to manage infections from gram-positive and gram-negative bacteria. In the process of synthesis, storage and transportation, it is inevitable to form polymers (aggregates) which may cause adverse reactions to patients. The above chromatograms demonstrate that the MONOBIO SEC 120 Å Monodisperse HPLC Column can provide excellent separation between the drug substance and the polymers used in the formulation, but also can separate the polymers from each other in the same separation.

120 Å MONODISPERSE SEC COLUMNS

Designed for the separation by hydrodynamic volume (size) of small molecule drugs, heparin, peptides, glycans and small oligonucleotide fragments

~5 kDA Peptide and Aggregates

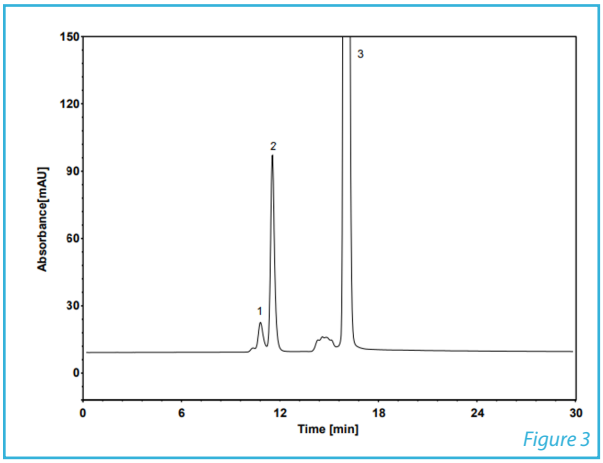


Figure 3

Column:	MBSECDIP127830
Description:	MONOBIO SEC DIP 120 Å, 5.0 µm, 7.8 x 300 mm Monodisperse HPLC Column
Mobile Phase:	40/60 v/v ACN/0.1% TFA in H_2O
Flow Rate:	0.7 ml/min
Temperature:	30°C
Injection:	20 µl
Detection:	UV 276 nm
Analyte ID:	1. Aggregate of Peptide 2. Peptide 3. m-Cresol

The above chromatogram demonstrates the ability to separate a low MW peptide from its aggregates using a MONOBIO SEC 120 Å Monodisperse HPLC Column

Low MW Heparin

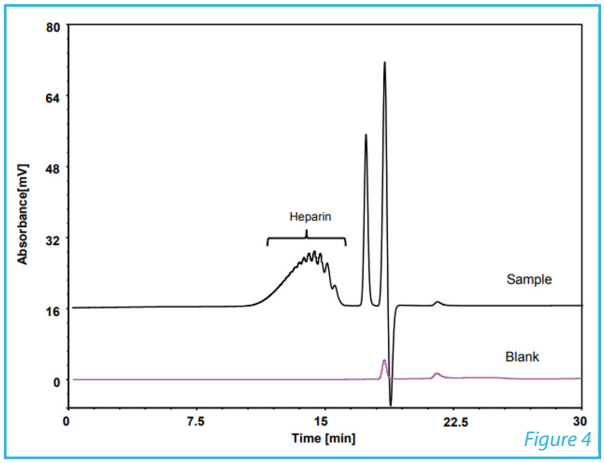


Figure 4

Column:	MBSECDIP127830
Description:	MONOBIO SEC DIP 120 Å, 5.0 µm, 7.8 x 300 mm Monodisperse HPLC Column
Mobile Phase:	100 mM ammonium acetate/H_2O pH 5.2
Flow Rate:	0.6 ml/min
Temperature:	35°C
Injection:	20 µl
Detection:	RID, 40°C
Analyte ID:	1. Heparin

Low molecular weight heparin is widely used in the prevention and treatment of venous thromboembolism. The assay on its molecular weight and distribution is important as it affects the therapeutic effect. The above chromatogram demonstrates the chromatographic profile of a low molecular weight heparin generated on a MONOBIO SEC 120 Å Monodisperse HPLC Column, which can be used for calculating the molecular weight distribution of heparin in the sample.

150 Å MONODISPERSE SEC COLUMNS

Designed for the separation by hydrodynamic volume (size) of small molecule drugs, heparin, peptides, glycans, small oligonucleotide fragments, and small proteins.

Terlipressin

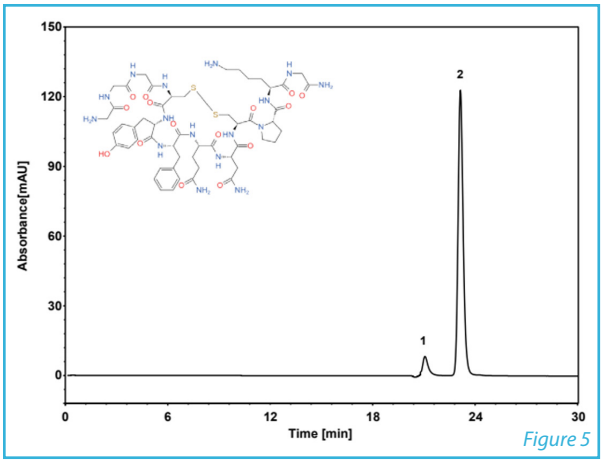


Figure 5

Column: MBSECDIP527830
Description: MONOBIO SEC DIP 150 Å, 5.0 µm, 7.8 x 300 mm Monodisperse HPLC Column
Mobile Phase: 100 mM Na_2SO_4 in 100 mM phosphate buffer/H_2O
Flow Rate: 0.5 ml/min
Temperature: 30°C
Injection: 10 µl
Detection: UV 274 nm
Analyte ID: 1. Impurity U
2. Terlipressin

RT (min)	Theoretical Plate (USP)	Tailing Factor (USP)	Resolutioin (USP)
23.080	29589	1.19	3.63

Terlipressin is a peptide-like pro-drug to improve kidney function in adults. terlipressin and its impurity can be well separated on a MONOBIO SEC 150 Å Monodisperse HPLC Column as shown in the chromatogram above.

Exenatide Injection Solution

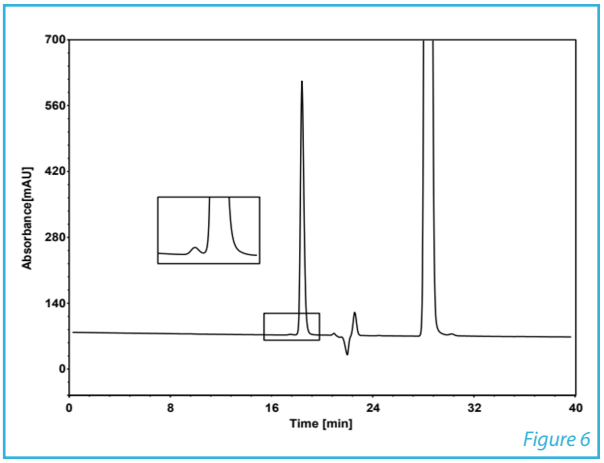


Figure 6

Column: MBSECDIP527830
Description: MONOBIO SEC DIP 150 Å, 5.0 µm, 7.8 x 300 mm Monodisperse HPLC Column
Mobile Phase: 40/60 v/v ACN/0.1% TFA in H_2O
Flow Rate: 0.5 ml/min
Temperature: 30°C
Injection: 20 µl
Detection: UV 214 nm
Analyte ID: 1. Exenatide

RT (min)	Theoretical Plate (USP)	Tailing Factor (USP)	Resolutioin (USP)
18.413	20924	1.25	1.65

Exenatide, composed of 39 amino acids, is the active ingredient in an injectable mediciation that helps control blood sugar in the body. In the chromatogram, exenatide and its aggregate can be baseline separated on a MONOBIO SEC 150 Å Monodisperse HPLC Column.

150 Å MONODISPERSE SEC COLUMNS

Designed for the separation by hydrodynamic volume (size) of small molecule drugs, heparin, peptides, glycans, small oligonucleotide fragments, and small proteins.

Poloxamer 188 (P188) in Protein Solution

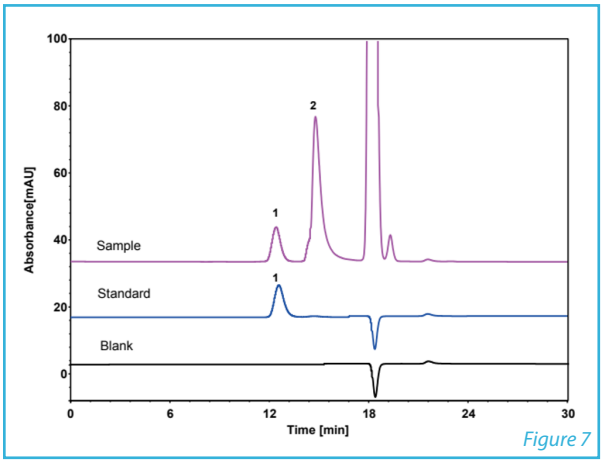


Figure 7

Column:	MBSECDIP527830
Description:	MONOBIO SEC DIP 150 Å, 5.0 µm, 7.8 x 300 mm Monodisperse HPLC Column
Mobile Phase:	10 mM ammonium acetate/H_2O, pH 5.2
Flow Rate:	0.6 ml/min
Temperature:	25°C
Injection:	20 µl
Detection:	RID, 40°C
Analyte ID:	1. Poloxamer 188 (P188) 2. Protein

Poloxamer 188 (P188) is a non-ionic tri-block co-polymer surfactant widely used in producing biological formulations to protect proteins. The residual P188 in the final drug product may cause adverse reactions in the human body. The MONOBIO SEC 150 Å Monodisperse HPLC Column determines the content of P188 in the formulation, free of interference from the drug substance API (protein) and other components in the sample in the chromatogram above. Also, it is noted that other components including the drug substance protein are well separated from P188. This method is well suited for a product release method of protein-based formulations.

300 Å MONODISPERSE SEC COLUMNS

Designed for the separation by hydrodynamic volume (size) of mAbs and aggregates.

Separation of mAb, Aggregates and Heavy Chain and Light Chain Fragments

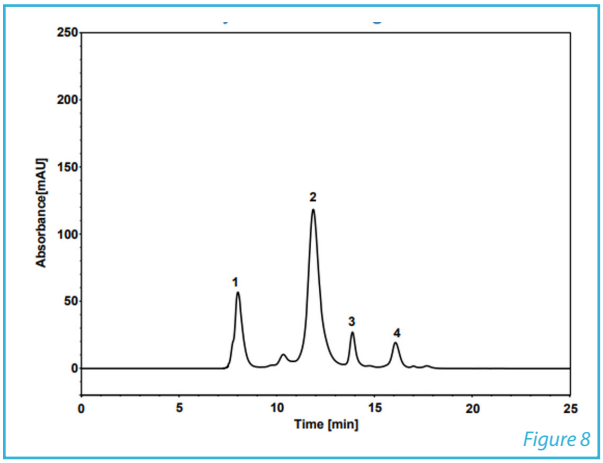


Figure 8

Column:	MBSECDIP227830
Description:	MONOBIO SEC DIP 300 Å, 5.0 µm, 7.8 x 300 mm Monodisperse HPLC Column
Mobile Phase:	300 mM NaCl in 50 mM phosphate buffer, pH 6.8
Flow Rate:	0.7 ml/min
Temperature:	25°C
Injection:	10 µl
Detection:	UV 214 nm
Analyte ID:	1. Aggregate (MW ~900 kDa) 2. mAb (MW ~ 150 kDa) 3. Heavy chain (MW ~50 kDa) 4. Light chain (MW ~25 kDa)

The separation of the mAb (~150 kDa), its aggregates (tetramer, ~900 kDa) and fragments (HC, ~50 kDa, and LC, ~25 kDa) on a MONOBIO SEC 300 Å Monodisperse HPLC Column demonstrates its suitability for simultaneous separation of mAbs, and its related aggregates and fragments.

300 Å MONODISPERSE SEC COLUMNS

Designed for the separation by hydrodynamic volume (size) of mAbs and aggregates.

Separation of mAb and Aggregates (Ultra-Fast Analysis)

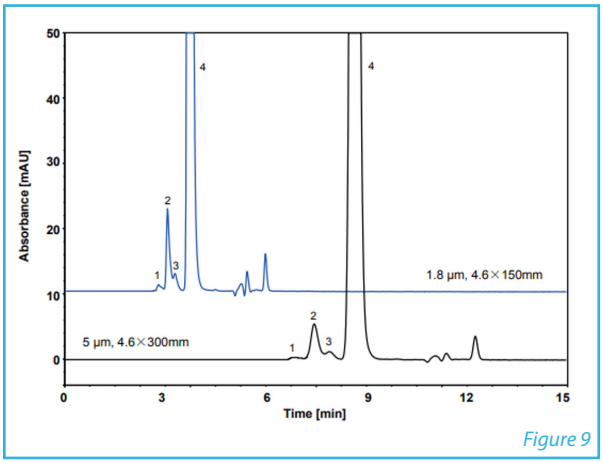


Figure 9

Column:	1. MBSECDIP204615 2. MBSECDIP224630
Description:	1. MONOBIO SEC DIP 300 Å, 1.8 µm, 4.6 x 150 mm Monodisperse HPLC Column 2. MONOBIO SEC DIP 300 Å, 5.0 µm, 4.6 x 300 mm Monodisperse HPLC Column
Mobile Phase:	300 mM NaCl in 50 mM phosphate buffer, pH 6.8
Flow Rate:	0.35 ml/min
Temperature:	30°C
Injection:	5 µl
Detection:	UV 280 nm
Analyte ID:	Trastuzumab Biosimilar (5 mg/ml) 1-3. Aggregates 4. Trastuzamab (mAb)

Aggregate determination by SEC is one of the most frequently run assays in mAb drug development and drug manufacturing. Very often, fast analysis is desired for better productivity.

Figure 9 shows that the MONOBIO SEC 300 Å Monodisperse HPLC Column can be scaled between particle sizes and column lengths to adapt a separation for a fit for purpose method. By reducing the particle size to 1.8 µm from 5.0 µm you can increase the efficiency and leverage efficiency to maintain similar resolution to reduce analysis time. This increased efficiency allows you to decrease the column length by ½, which in turn allows you to decrease the analysis time by a factor of 2.

300 Å MONODISPERSE SEC COLUMNS

Designed for the separation by hydrodynamic volume (size) of mAbs and aggregates.

Separation of mAbs, Aggregates and Fragments scaling from HPLC to UHPLC particle sizes

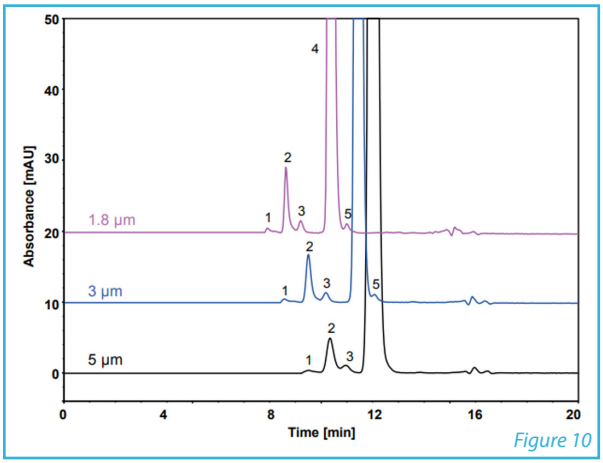


Figure 10

Particle Size	N (4)	Rs (1,2)	Rs (2,3)	Rs (3,4)	Rs (4,5)
1.8 µm	22668	2.21	1.95	3.83	2.33
3 µm	17006	2.84	1.88	3.58	1.06
5 µm	9616	2.29	0.94	1.68	/

Column:	1. MBSECDIP204630 2. MBSECDIP214630 3. MBSECDIP224630
Description:	1. MONOBIO SEC DIP 300 Å, 1.8 µm, 4.6 x 300 mm Monodisperse HPLC Column 2. MONOBIO SEC DIP 300 Å, 3.0 µm, 4.6 x 300 mm Monodisperse HPLC Column 3. MONOBIO SEC DIP 300 Å, 5.0 µm, 4.6 x 300 mm Monodisperse HPLC Column
Mobile Phase:	90/10 v/v 50 mM phosphate buffer, pH 6.8/ACN
Flow Rate:	0.25 ml/min
Temperature:	30°C
Injection:	5 µl
Detection:	UV 280 nm
Analyte ID:	Trastuzumab Biosimilar (5 mg/ml) 1-3. Aggregates 4. Trastuzamab (mAb) 5. Fragment

In this separation of trastuzumab and its aggregates/fragments, the full range of particle sizes is explored using the MONOBIO SEC 300 Å Monodisperse HPLC columns. The column size is held constant and a one factor approach reducing particle size is used to determine how improved efficiency impacts the separations.

In the fit for purpose 5.0 µm method, the column provides sufficient separation between the main peak of trastuzumab and its aggregates, but it doesn't fully resolve the fragment adjacent to the main peak.

To see if we can improve the separation for the fit for purpose method, a 3.0 µm column is explored both the resolution between the mAb and its aggregates and among its aggregates is improved significantly and a fragment peak is partially resolved from the main mAb peak.

For a full quantitative assay, a 1.8 µm column should be employed as it further resolves all the peaks and almost completely baseline resolves peak 5, which is a fragment of the main trastuzumab peak.

300 Å MONODISPERSE SEC COLUMNS

Designed for the separation by hydrodynamic volume (size) of mAbs and aggregates.

Bispecific Antibody

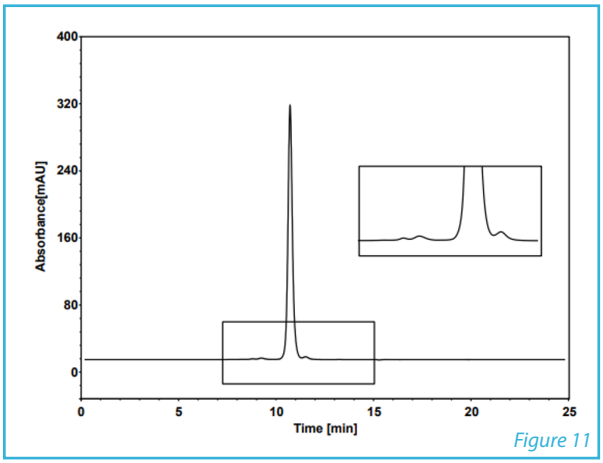


Figure 11

Column:	MBSECDIP204630
Description:	MONOBIO SEC DIP 300 Å, 1.8 µm, 4.6 x 300 mm Monodisperse HPLC Column
Mobile Phase:	100 mM Na_2SO_4 in 50 mM phosphate buffer, pH 6.8
Flow Rate:	0.25 ml/min
Temperature:	30°C
Injection:	10 µl
Detection:	UV 214 nm
Analyte ID:	Bispecific Antibody (10 mg/ml)

Trispecific Antibody

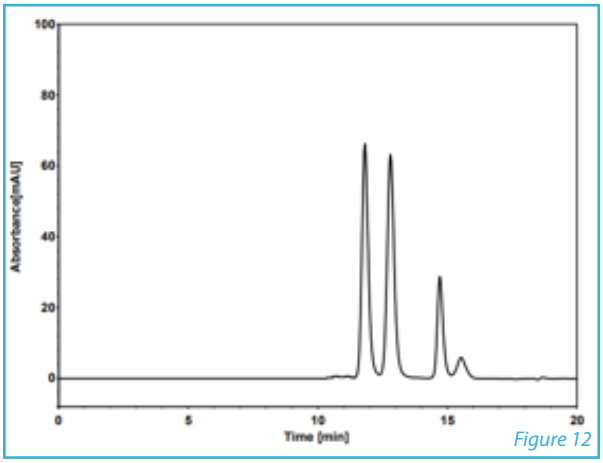


Figure 12

Column:	MBSECDIP214630
Description:	MONOBIO SEC DIP 300 Å, 3.0 µm, 4.6 x 300 mm Monodisperse HPLC Column
Mobile Phase:	90/10 v/v 300 mM NaCl in 50 mM phosphate buffer, pH 6.8/ACN
Flow Rate:	0.21 ml/min
Temperature:	30°C
Injection:	2 µl
Detection:	UV 280 nm
Analyte ID:	Trispecific Antibody (5mg/ml)

300 Å MONODISPERSE SEC COLUMNS

Designed for the separation by hydrodynamic volume (size) of mAbs and aggregates.

ADC (Antibody-Drug Conjugate)

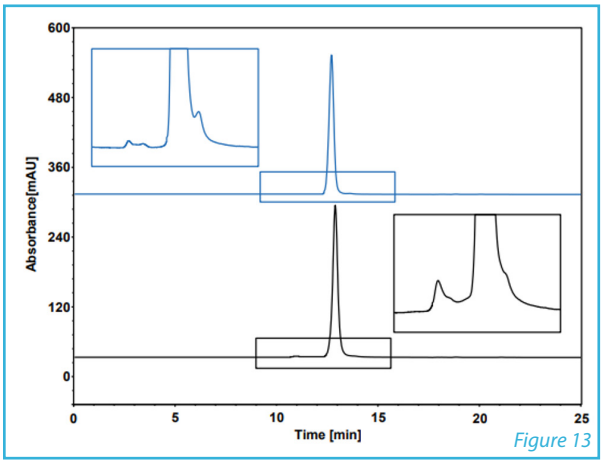


Figure 13

Column:	MBSECDIP214630
Description:	MONOBIO SEC DIP 300 Å, 3.0 µm, 4.6 x 300 mm Monodisperse HPLC Column
Mobile Phase:	90/10 v/v 300 mM NaCl in 50 mM phosphate buffer, pH 6.8/ACN
Flow Rate:	0.21 ml/min
Temperature:	30°C
Injection:	2 µl
Detection:	UV 280 nm
Analyte ID:	ADC (10 mg/ml)

The ability of monoclonal antibodies to specifically bind a target antigen and neutralize or stimulate its activity is the basis for the rapid growth and development of the therapeutic antibody field.

In recent years, traditional immunoglobulin antibodies have been further engineered for better efficacy and safety, and technological developments in the field enabled the design and production of engineered antibodies capable of mediating therapeutic functions unattainable by conventional antibody modalities.

Polyspecific antibodies and antibody–drug conjugates (ADCs) are representative of the growing modalities each with several approved drugs and dozens more in the clinical development.

Figures 11, 12, and 13 show that MONOBIO SEC 300 Å Monodisperse HPLC columns can resolve critical peak impurities, aggregates and fragments to improve SEC method development.

300 Å MONODISPERSE SEC COLUMNS

Designed for the separation by hydrodynamic volume (size) of mAbs and aggregates.

Fusion Protein (Analytical Scale)

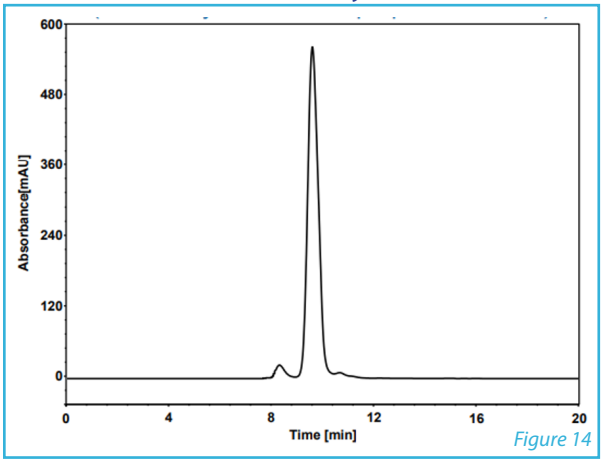


Figure 14

Column:	MBSECDIP227830
Description:	MONOBIO SEC DIP 300 Å, 5.0 µm, 7.8 x 300 mm Monodisperse HPLC Column
Mobile Phase:	100 mM Na_2SO_4 in 50 mM phosphate buffer, pH 6.8
Flow Rate:	0.7 ml/min
Temperature:	30°C
Injection:	10 µl
Detection:	UV 280 nm
Analyte ID:	Fusion Protein (MW ~78 kDa, 80 mg/ml)

In the above separation a fusion protein (main peak), and its aggregate (before the main peak) and HC/LC fragment (next, adjacent to the main peak) are separated under optimized conditions on a MONOBIO SEC 300 Å Monodisperse HPLC column. This column is able to separate all 3 main components protein, aggregate and fragments with excellent resolving power.

Fusion Protein (Preparative Scale)

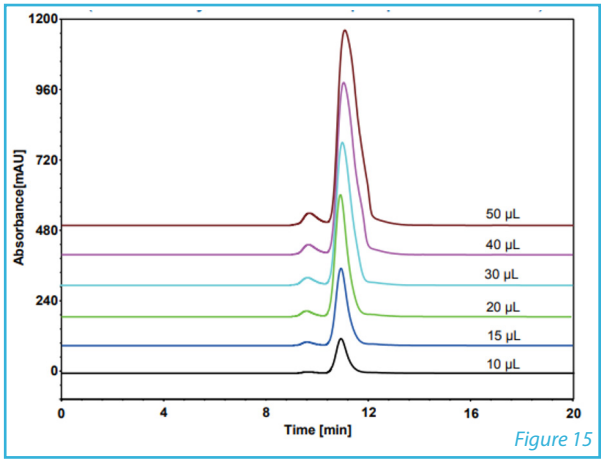


Figure 15

Column:	MBSECDIP222030
Description:	MONOBIO SEC DIP 300 Å, 5.0 µm, 20.0 x 300 mm Monodisperse HPLC Column
Mobile Phase:	100 mM Na_2SO_4 in 50 mM phosphate buffer, pH 6.8
Flow Rate:	4.0 ml/min
Temperature:	30°C
Injection:	10/15/20/30/40/50 µl
Detection:	UV 280 nm
Analyte ID:	Fusion Protein (MW ~78 kDa, 80 mg/ml)

In the above chromatogram, based on the results at an analytical scale, this separation was optimized and scaled for a larger 20.0 mm ID column to collect more purified material fractions of the fusion protein and leave the non-preferred aggregation products behind. This is another advantage of the MONOBIO SEC 300 Å Monodisperse HPLC column platform, whereas the material can be scaled from analytical to preparative applications, whilst it maintains the resolution at higher loading concentrations due to its high surface area and pore volume.

500 Å MONODISPERSE SEC COLUMNS

Designed for the separation by hydrodynamic volume (size) of mAbs, higher-order aggregates, large proteins, and small DNA/RNA.

Large Fusion Protein

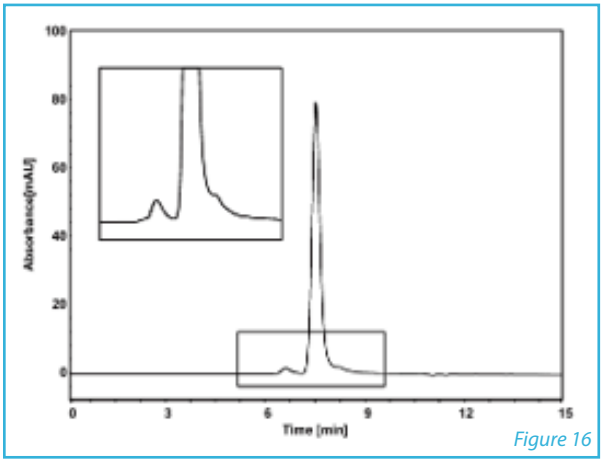


Figure 16

Column:	MBSECDIP324630
Description:	MONOBIO SEC DIP 500 Å, 5 µm, 4.6 x 300 mm Monodisperse HPLC Column
Mobile Phase:	150 mM phosphate buffer, pH 6.8
Flow Rate:	0.35 ml/min
Temperature:	30°C
Injection:	5 µl
Detection:	UV 280 nm
Analyte ID:	Fusion Protein (1 mg/ml/H_2O)

In the above separation a fusion protein (main peak), and its aggregate (before the main peak) and HC/LC fragment (next, adjacent to the main peak) are separated under optimized conditions on a MONOBIO SEC 500 Å Monodisperse HPLC column. This column is able to separate all 3 main components protein, aggregate and fragments with excellent resolving power.

Catalase and Catalase-MPC Nanocapsules

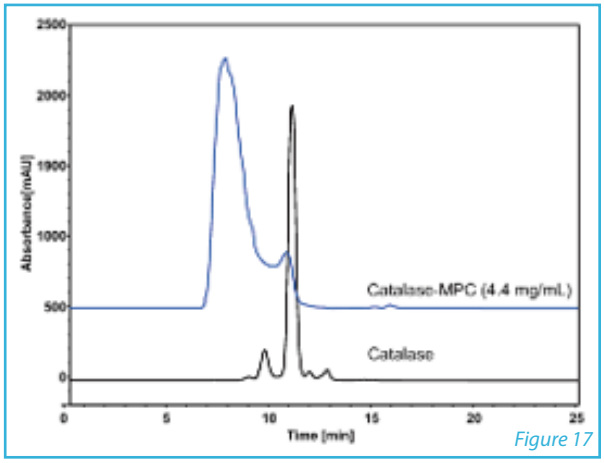


Figure 17

Column:	MBSECDIP327830
Description:	MONOBIO SEC DIP 500 Å, 5.0 µm, 7.8 x 300 mm Monodisperse HPLC Column
Mobile Phase:	150 mM phosphate buffer, pH 6.8
Flow Rate:	0.8 ml/min
Temperature:	25°C
Injection:	10 µl
Detection:	UV 214 nm
Analyte ID:	Catalase (MW ~300 kDa) Catalase-MPC (MW~ 400-600 kDa)

In the above chromatogram, catalase is injected and catalase with its MPC (multi-protein complex) native form allows researchers to understand the purity and activity of the catalase enzyme for further structural studies, as well as kinetic studies of the enzyme activation. This will provide insight into its biological role and its mechanistic activity.

700 Å MONODISPERSE SEC COLUMNS

Designed for the separation by hydrodynamic volume (size) of AAVs (adeno-associated viruses).

Aggregate determination of various AAV serotypes

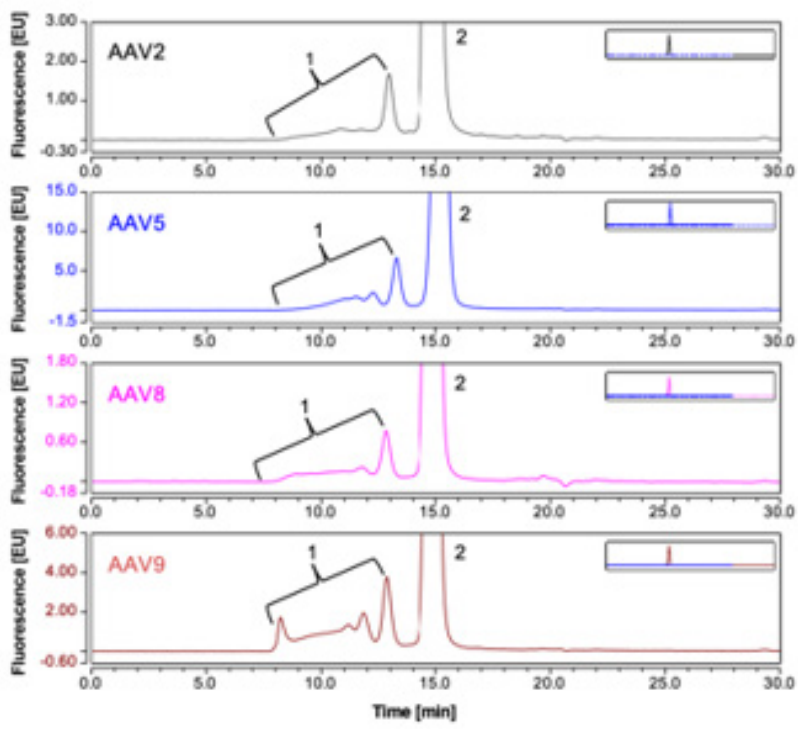


Figure 18

In the above chromatogram, we are establishing a "platform" method and applying it to aggregate determination for various AAV serotypes, including AAV2, AAV5, AAV8 and AAV9. In all cases, baseline separations were achieved between the AAV and its aggregates, thus we are able to move this methodology onto a fit for purpose platform.

Column:	MBSECDIP714630
Description:	MONOBIO SEC DIP 700 Å, 3 µm, 4.6 x 300 mm Monodisperse HPLC Column
Mobile Phase:	300 mM KCl in 50 mM phosphate buffer, pH 6.8
Flow Rate:	0.21 ml/min
Temperature:	30°C
Injection:	5 µl
Detection:	FLD (Ex 250 nm, Em 350 nm)
Analyte ID:	AAV Serotype sample AV2 (1.0E+12vg/ml) AAV5 (1.0E+12vg/ml) AAV8 (1.0E+12vg/ml) AAV9 (1.0E+12vg/ml)
Peak ID:	1 – Aggregates 2 – Monomer

1000 Å MONODISPERSE SEC COLUMNS

Designed for the separation by hydrodynamic volume (size) of aggregates and fragments of mRNAs, circlular RNA, RV, AV and aggregates and fragments of plasmids.

Plasmids

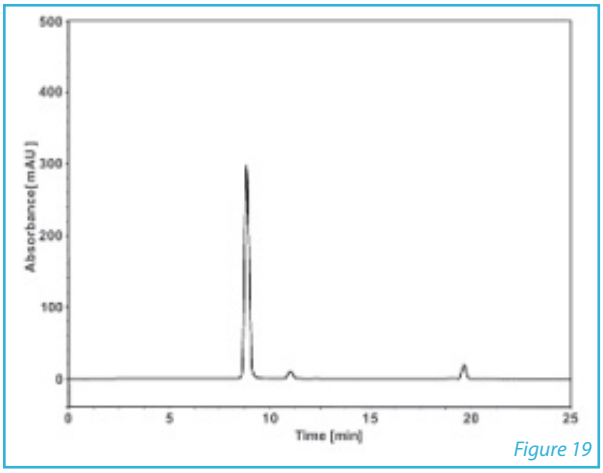


Figure 19

Column:	MBSECDIP414630
Description:	MONOBIO SEC DIP 1000 Å, 3 µm, 4.6 x 300 mm Monodisperse HPLC Column
Mobile Phase:	300 mM NaCl in 50 mM phosphate buffer, pH 6.8
Flow Rate:	0.21 ml/min
Temperature:	30°C
Injection:	10 µl
Detection:	UV 260 nm (2.4 µL flow cell)
Analyte ID:	Plasmid

In the above chromatogram, the plasmid is considered large size, therefore a 1000 Å wide-pore SEC column is required to separate the target supercoiled plasmids from its impurities such as its aggregates and fragments. In this application, the desired plasmid can be well separated from impurities in a real-life sample on a MONOBIO SEC 1000 Å Monodisperse HPLC column.

circRNA

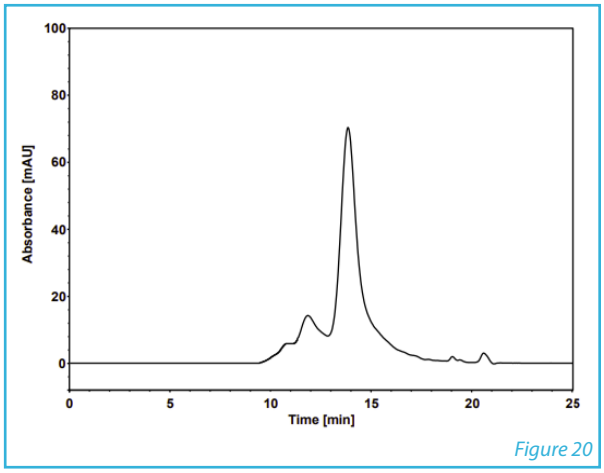


Figure 20

Column:	MBSECDIP414630
Description:	MONOBIO SEC DIP 1000 Å, 3 µm, 4.6 x 300 mm Monodisperse HPLC Column
Mobile Phase:	300 mM NaCl in 50 mM phosphate buffer, pH 6.8
Flow Rate:	0.2 ml/min
Temperature:	30°C
Injection:	2 µl
Detection:	UV 260 nm
Analyte ID:	circRNA (3.5 kbp)

In the above chromatogram, the circular RNA is large, therefore a 1000 Å wide-pore SEC columns is required to separate the target circular RNA.

2000 Å MONODISPERSE SEC COLUMNS

Designed for the separation by hydrodynamic volume (size) of aggregates and fragments of mRNAs, circlular RNA, RV, AV and aggregates and fragments of plasmids.

4k Base Pair - Plasmid

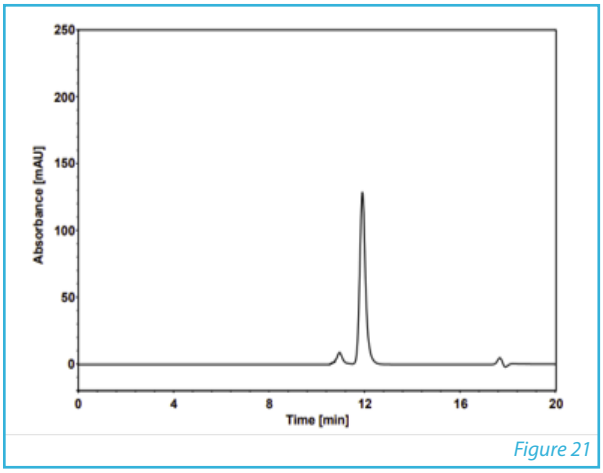


Figure 21

Column:	MBSECDIP614630
Description:	MONOBIO SEC DIP 2000 Å, 3 µm, 4.6 x 300 mm Monodisperse HPLC Column
Mobile Phase:	300 mM NaCl in 50 mM phosphate buffer, pH 6.8
Flow Rate:	0.2 ml/min
Temperature:	25°C
Injection:	5 µl
Detection:	UV 260 nm
Analyte ID:	Plasmid (4 kbp)

6k Base Pair - Plasmid

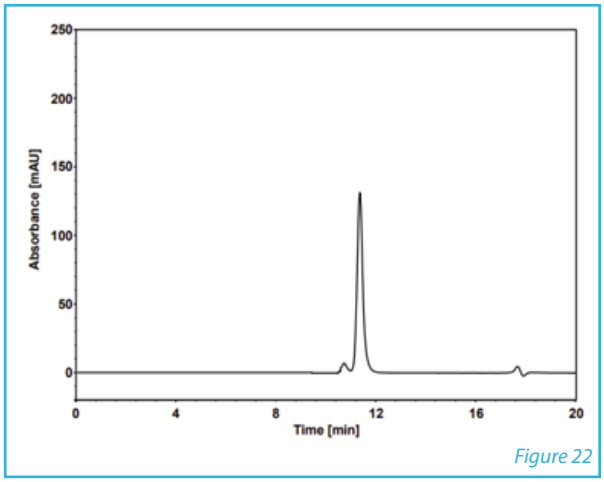


Figure 22

Column:	MBSECDIP614630
Description:	MONOBIO SEC DIP 2000 Å, 3 µm, 4.6 x 300 mm Monodisperse HPLC Column
Mobile Phase:	300 mM NaCl in 50 mM phosphate buffer, pH 6.8
Flow Rate:	0.2 ml/min
Temperature:	25°C
Injection:	5 µl
Detection:	UV 260 nm
Analyte ID:	Plasmid (6 kbp)

In the above chromatograms, these plasmids are considered large. Therefore, the 2000 Å wide-pore SEC columns are required to separate the target supercoiled plasmids from their impurities, such as its aggregates and fragments.

MONOBIO SEC PART NUMBER TABLES

120 Å Monodisperse Columns

Pore Size (Å)	Particle Size (µm)	Column ID (mm)	Column Length (mm)	MONOBIO Part Number
120	1.8	4.6	150	MBSECDIP104615
120	1.8	4.6	300	MBSECDIP104630
120	3	4.6	50	MBSECDIP114605
120	3	4.6	150	MBSECDIP114615
120	3	4.6	300	MBSECDIP114630
120	5	4.6	50	MBSECDIP124605
120	5	4.6	300	MBSECDIP124630
120	3	7.8	150	MBSECDIP117815
120	3	7.8	300	MBSECDIP117830
120	5	7.8	300	MBSECDIP127830

150 Å Monodisperse Columns

Pore Size (Å)	Particle Size (µm)	Column ID (mm)	Column Length (mm)	MONOBIO Part Number
150	1.8	4.6	150	MBSECDIP504615
150	1.8	4.6	300	MBSECDIP504630
150	3	4.6	50	MBSECDIP514605
150	3	4.6	150	MBSECDIP514615
150	3	4.6	300	MBSECDIP514630
150	5	4.6	50	MBSECDIP524605
150	5	4.6	300	MBSECDIP524630
150	3	7.8	150	MBSECDIP517815
150	3	7.8	300	MBSECDIP517830
150	5	7.8	300	MBSECDIP527830

MONOBIO SEC PART NUMBER TABLES

300 Å Monodisperse Columns

Pore Size (Å)	Particle Size (µm)	Column ID (mm)	Column Length (mm)	MONOBIO Part Number
300	1.8	4.6	150	MBSECDIP204615
300	1.8	4.6	300	MBSECDIP204630
300	3	4.6	50	MBSECDIP214605
300	3	4.6	150	MBSECDIP214615
300	3	4.6	300	MBSECDIP214630
300	5	4.6	50	MBSECDIP224605
300	5	4.6	300	MBSECDIP224630
300	3	7.8	150	MBSECDIP217815
300	3	7.8	300	MBSECDIP217830
300	5	7.8	300	MBSECDIP227830

500 Å Monodisperse Columns

Pore Size (Å)	Particle Size (µm)	Column ID (mm)	Column Length (mm)	MONOBIO Part Number
500	1.8	4.6	150	MBSECDIP304615
500	1.8	4.6	300	MBSECDIP304630
500	3	4.6	50	MBSECDIP314605
500	3	4.6	150	MBSECDIP314615
500	3	4.6	300	MBSECDIP314630
500	5	4.6	50	MBSECDIP324605
500	5	4.6	300	MBSECDIP324630
500	3	7.8	150	MBSECDIP317815
500	3	7.8	300	MBSECDIP317830
500	5	7.8	300	MBSECDIP327830

MONOBIO SEC PART NUMBER TABLES

700 Å Monodisperse Columns

Pore Size (Å)	Particle Size (µm)	Column ID (mm)	Column Length (mm)	MONOBIO Part Number
700	3	4.6	150	MBSECDIP714615
700	3	4.6	300	MBSECDIP714630
700	3	7.8	150	MBSECDIP717815
700	3	7.8	300	MBSECDIP717830

1000 Å Monodisperse Columns

Pore Size (Å)	Particle Size (µm)	Column ID (mm)	Column Length (mm)	MONOBIO Part Number
1000	3	4.6	50	MBSECDIP414605
1000	3	4.6	150	MBSECDIP414615
1000	3	4.6	300	MBSECDIP414630

2000 Å Monodisperse Columns

Pore Size (Å)	Particle Size (µm)	Column ID (mm)	Column Length (mm)	MONOBIO Part Number
2000	3	4.6	50	MBSECDIP614605
2000	3	4.6	150	MBSECDIP614615
2000	3	4.6	300	MBSECDIP614630

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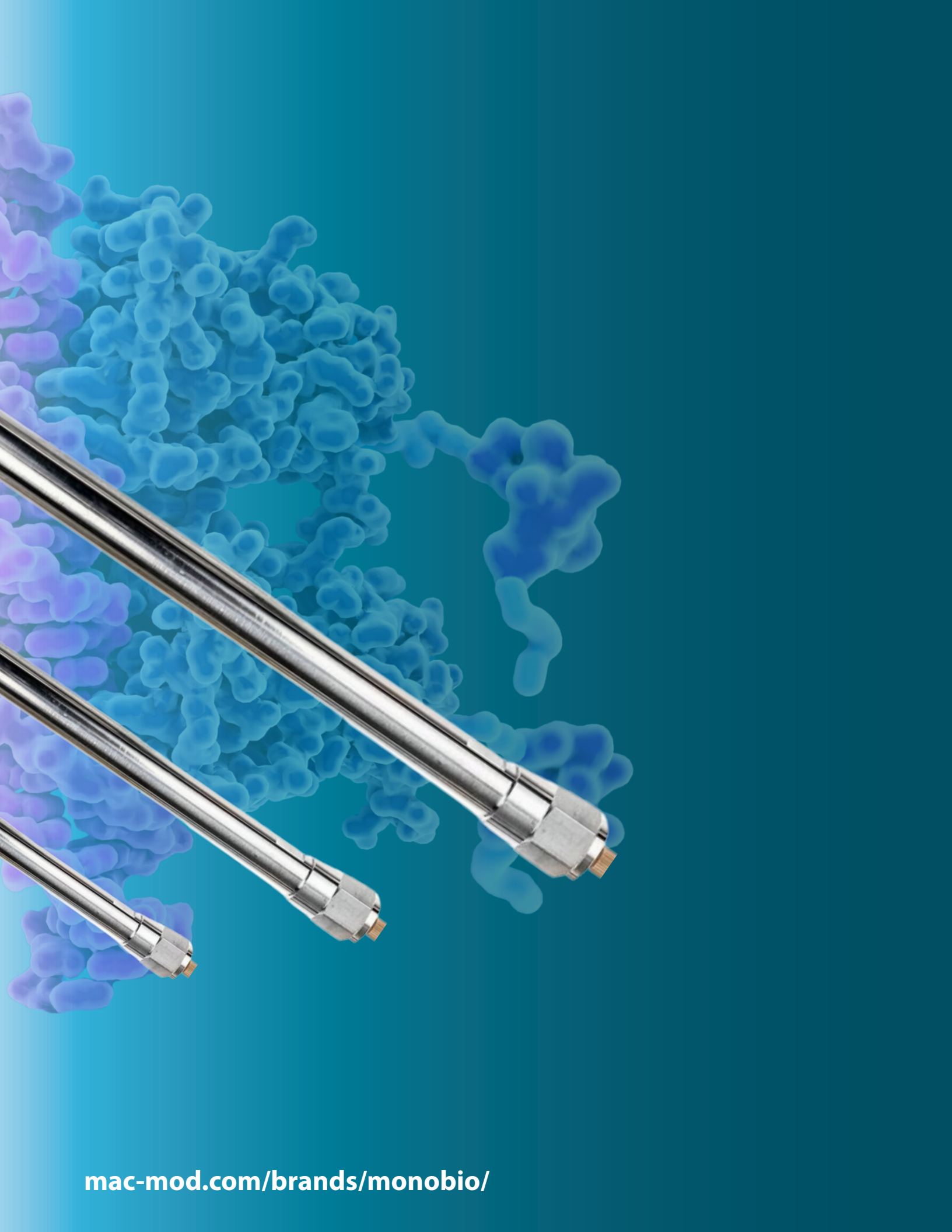

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