

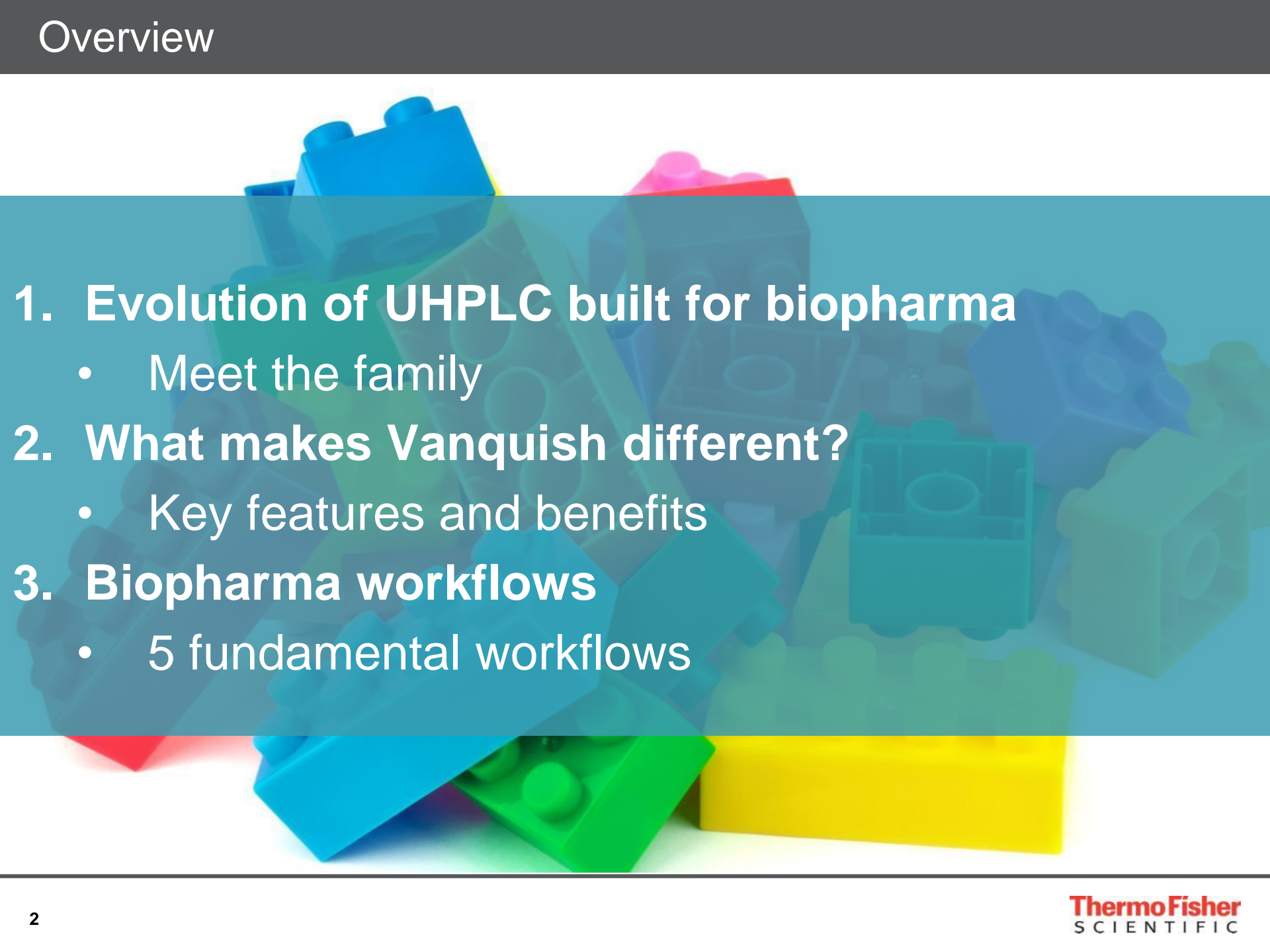


ThermoFisher
SCIENTIFIC

Separation Science Built for Biopharma

Pharma & Biopharma Tours | 2016

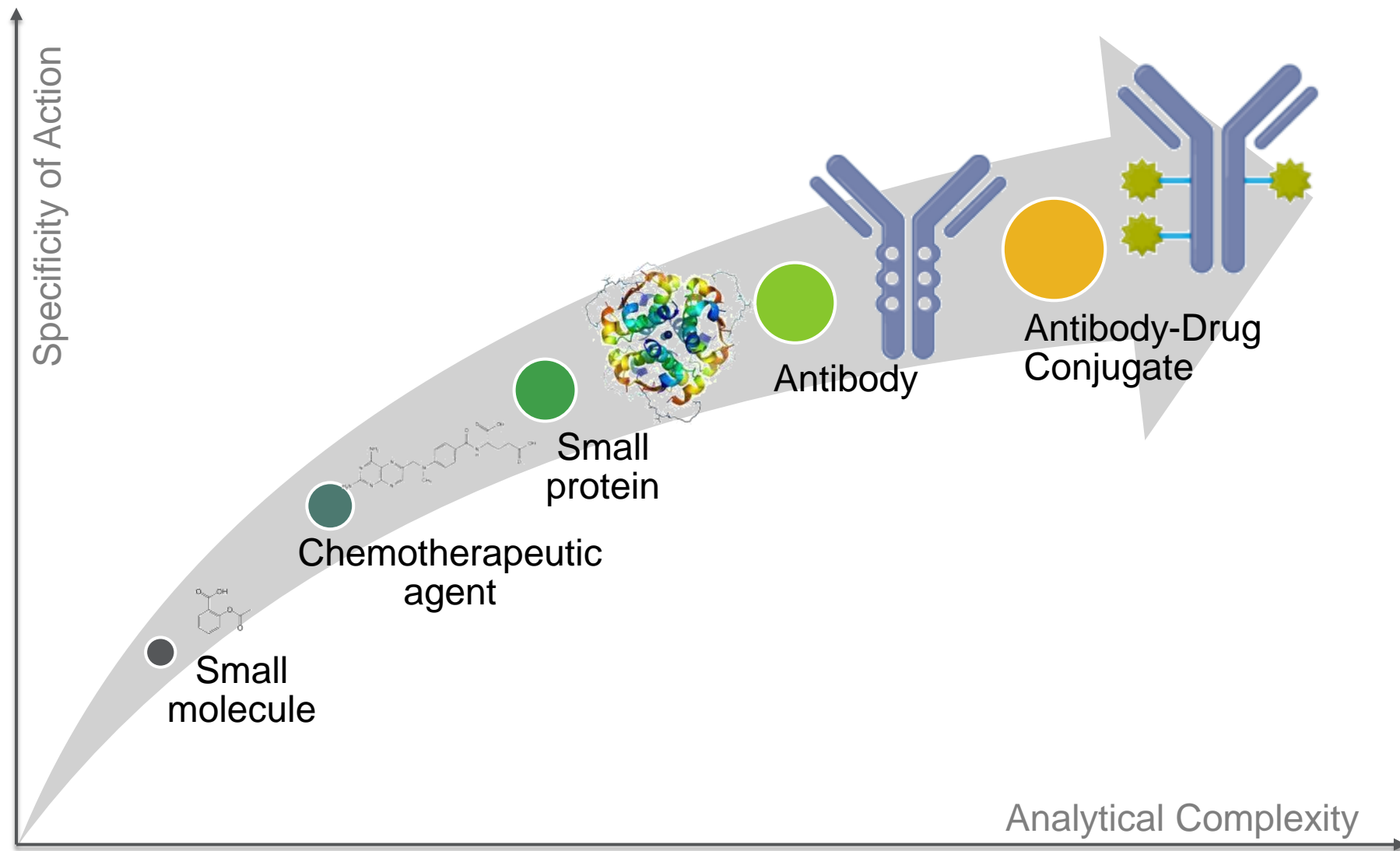
The world leader in serving science

- 
- 1. Evolution of UHPLC built for biopharma**
 - Meet the family
 - 2. What makes Vanquish different?**
 - Key features and benefits
 - 3. Biopharma workflows**
 - 5 fundamental workflows

Evolution of UHPLC Built for Biopharma



Why Focus on Biopharmaceuticals?



We Listened...

more **sensitivity**

easier **method development**

more **resolution**

more **productivity**

easier **interaction & operation**

more **robust & reliable**

more **sample capacity**

more **access to experts**

a system that was
“Built for Biopharma”

fresh & exciting instruments

faster **service**

Meet the Family

Thermo Scientific™ UltiMate™ 3000 BioRS UHPLC System

Established
biocompatible UHPLC



Thermo Scientific™ Vanquish™ Flex UHPLC System

New generation
biocompatible UHPLC
(quaternary pump, 1000 bar)



Thermo Scientific™ Vanquish™ UHPLC System

New generation
biocompatible high-end
UHPLC system
(binary pump, 1500 bar)

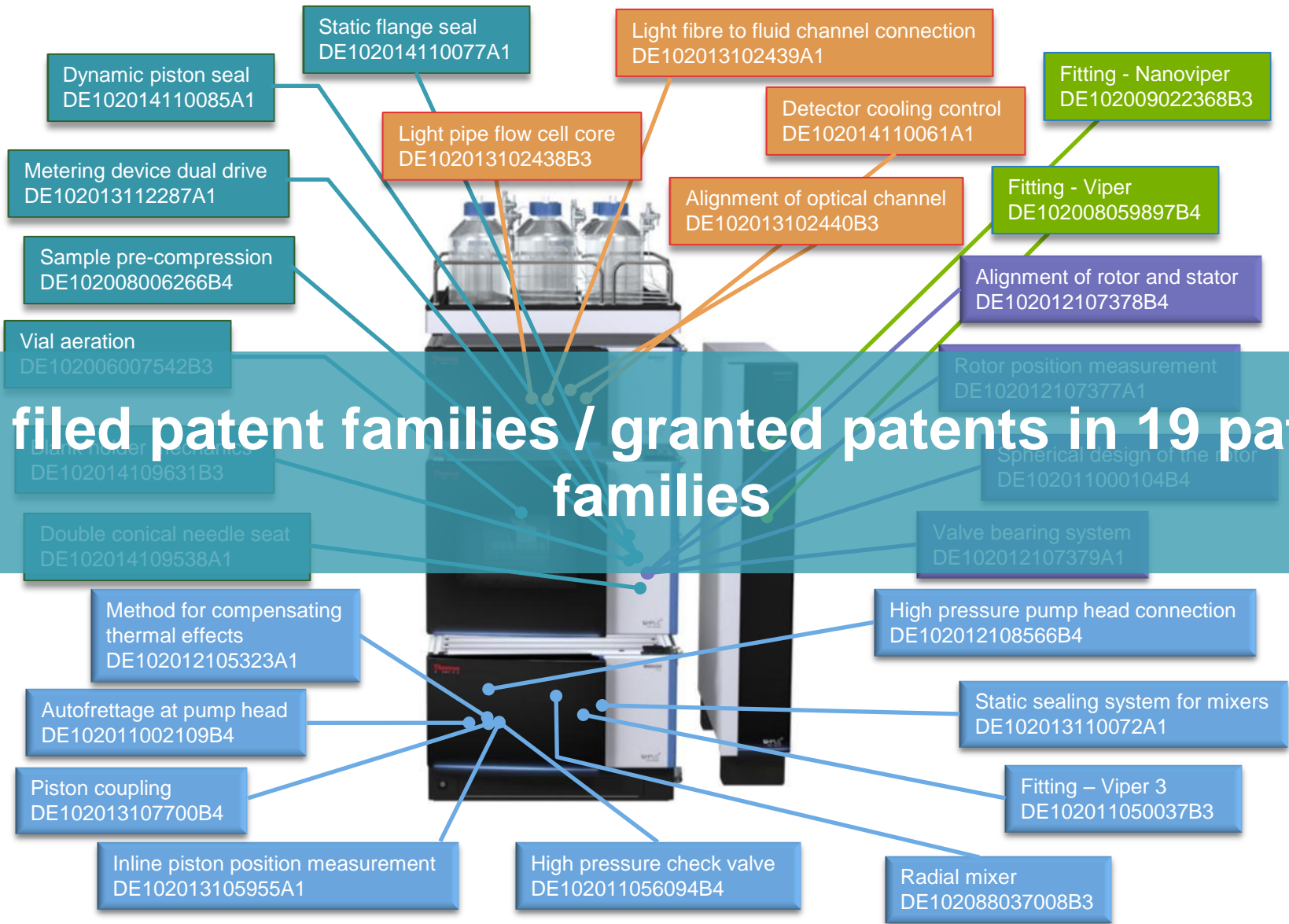


What Makes Vanquish Different?



Innovation in Every Aspect

26 filed patent families / granted patents in 19 patent families



What Makes Vanquish Different?

- Tool-free fluidics
- Compact footprint
- Intuitive fluidic layout
- Easy switching of modules/ maintenance



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Simplicity



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Simplicity

- Precise flow rate and gradient delivery
- Ultra low pump pressure ripple
- Thermo Scientific™ LightPipe™ Flow Cell
- Accurate temperature control
- Intelligent sample pre-compression



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- Customizable gradient delay volume
- Multiple heating modes
- Large sample capacity
- Broad flow rate and temperature range
- 4 x detectors and simple MS integration
- Supports long column capacity & all major chemistries



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Versatility



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Versatility

- Barcode reader
- Dry-air sample cooling
- Precision
- Thermo Scientific™ Dionex™ Chromeleon™ Chromatography Data System (CDS) Software



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Biopharma

Versatility

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- Multiple heating modes
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- 4 x detectors and simple MS integration
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Confidence

- Barcode reader
- Dry-air sample cooling
- Precision

Integration in Your Laboratory

- AppsLab application library
- Columns, Prep and Thermo Scientific™ Viper™ finger-tight connections
- Thermo Scientific™ Dionex™ Chromeleon™ Chromatography Data System (CDS) Software
- Fully integrated mass spectrometry solutions
- Seamless method transfer





... Increase productivity

- Industry-leading Operational Simplicity and throughput with eWorkflows
- Faster data processing, visualization, and reporting with dynamic updating and Intelligent Functionality built-in



... Control all your instrumentation

- Thermo Scientific LC/IC/GC/ (quant) MS plus >300 third-party modules
- Customizable instrument ePanels for consistent look and feel



... Achieve regulatory compliance

- Flexible to support research and compliant laboratories
- Comprehensive user management and eSignatures



... Simplify administration

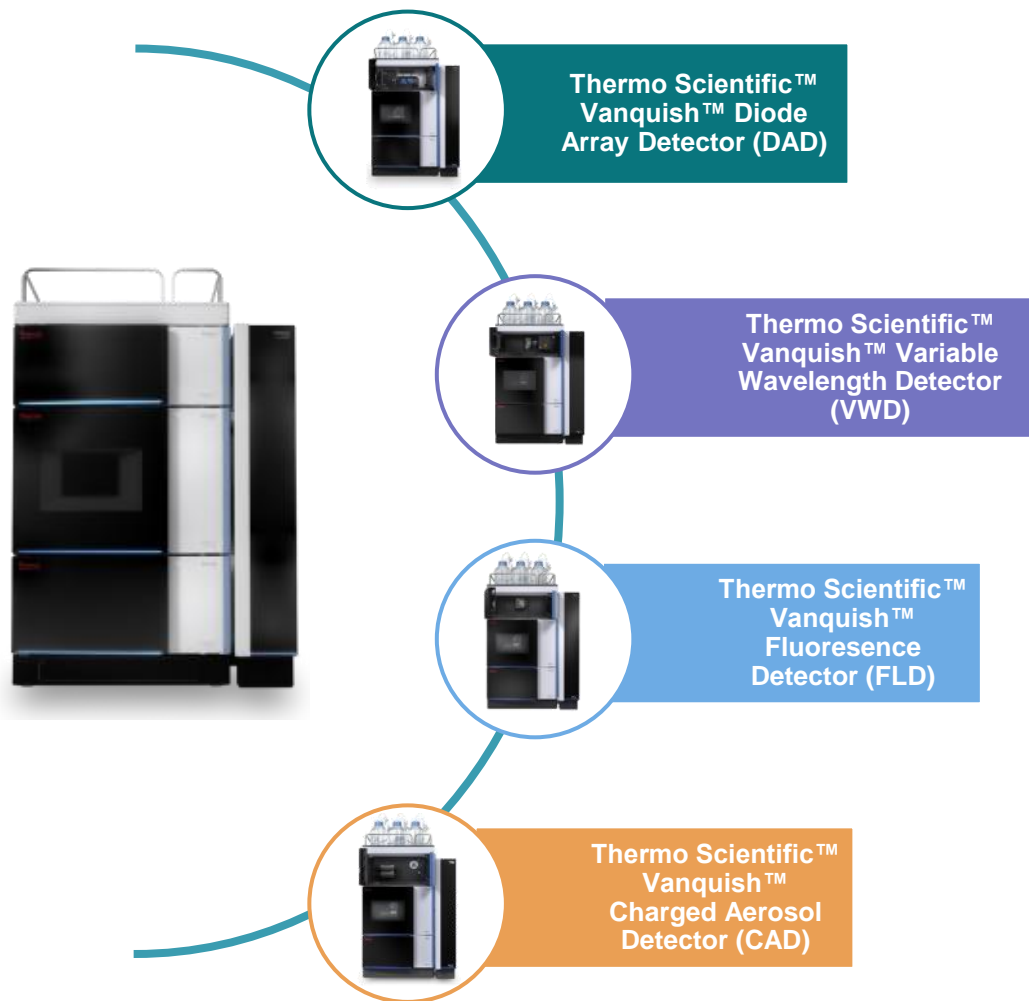
- Centralized or distributed data storage
- Scales from workstation to large global networks



... Connect your laboratory

- Easily interface with other laboratory software (e.g. LIMS)
- Download ready-to-run applications from AppsLab Library

Range of Detectors



- 4 modular detector options
- Can be used discretely or in series
 1. DAD with LightPipe technology outstanding signal to noise performance and linearity
 2. VWD supporting a wide operating range
 3. FLD with high detection precision
 4. CAD offers a sensitive, universal detection with a near uniform response



Thermo Scientific™
Vanquish™ Diode
Array Detector (DAD)



Thermo Scientific™
Vanquish™ Variable
Wavelength Detector
(VWD)



Thermo Scientific™
Vanquish™
Fluorescence
Detector (FLD)



Thermo Scientific™
Vanquish™
Charged Aerosol
Detector (CAD)

Sensitivity, linearity, and the flexibility to switch

- 4 modular detector options
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 1. DAD with LightPipe technology outstanding signal to noise performance and linearity
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Fully Integrated MS Solutions



- Dedicated connection kit connects the LC to the MS
- The column compartment can be located at either side of the LC instrument for optimal flow paths
- Control and processing depending on user preference
 - Thermo Scientific™ Xcalibur™ (with Thermo Scientific™ SII)
 - Chromeleon CDS
 - In both cases data can be exported for processing with other MS software packages

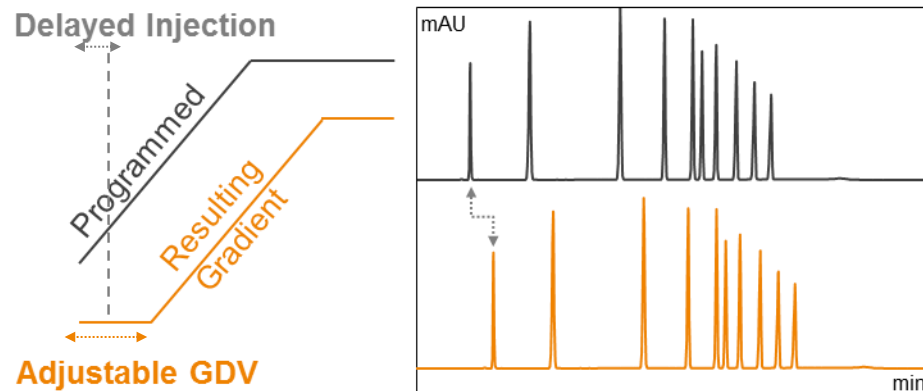
Fully Integrated MS Solutions



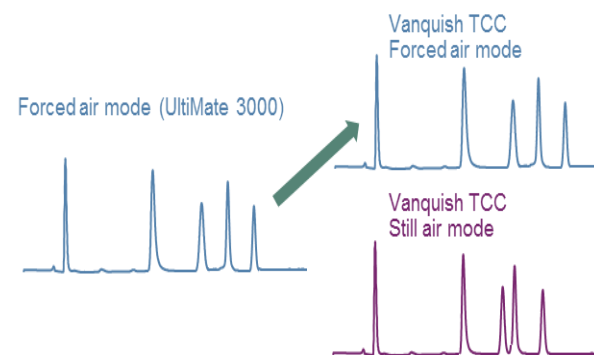
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 - Thermo Scientific™ Xcalibur™ (with Thermo Scientific™ SII)
 - Chromeleon CDS
- In both cases data can be exported for processing with other MS software packages

Simple Method Transfer

- Gradient delay volume (GDV) adaption
 - Adjustable metering device idle volume
 - Mixer and Viper capillaries
 - Delayed injection

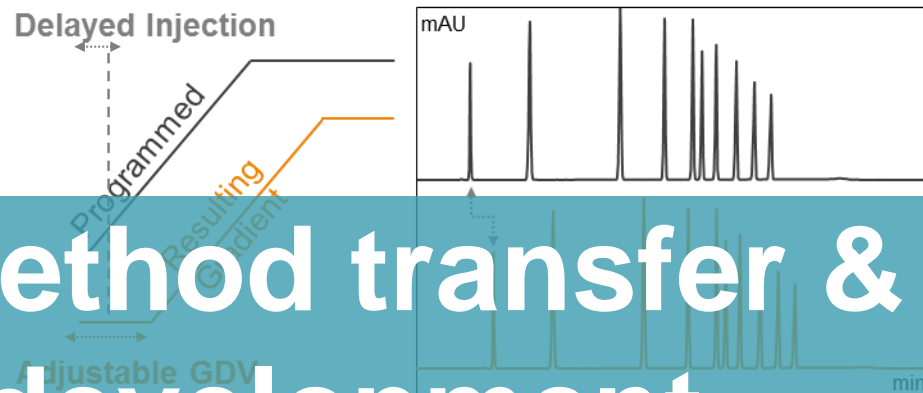


- Match the thermostating mode
 - Forced and still air mode give different results
 - Mimic thermal conditions used in existing systems
 - UltiMate 3000 column compartments or that of other (U)HPLC systems



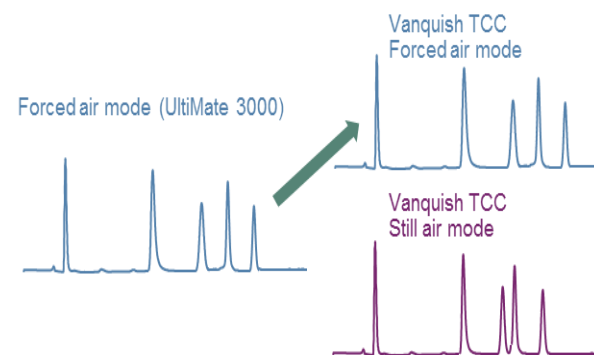
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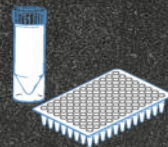


Easy, fast method transfer & method development

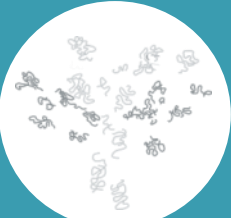
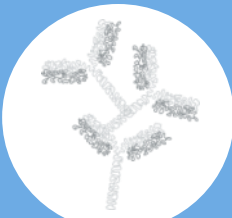


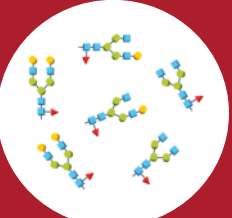
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Biopharma Workflows



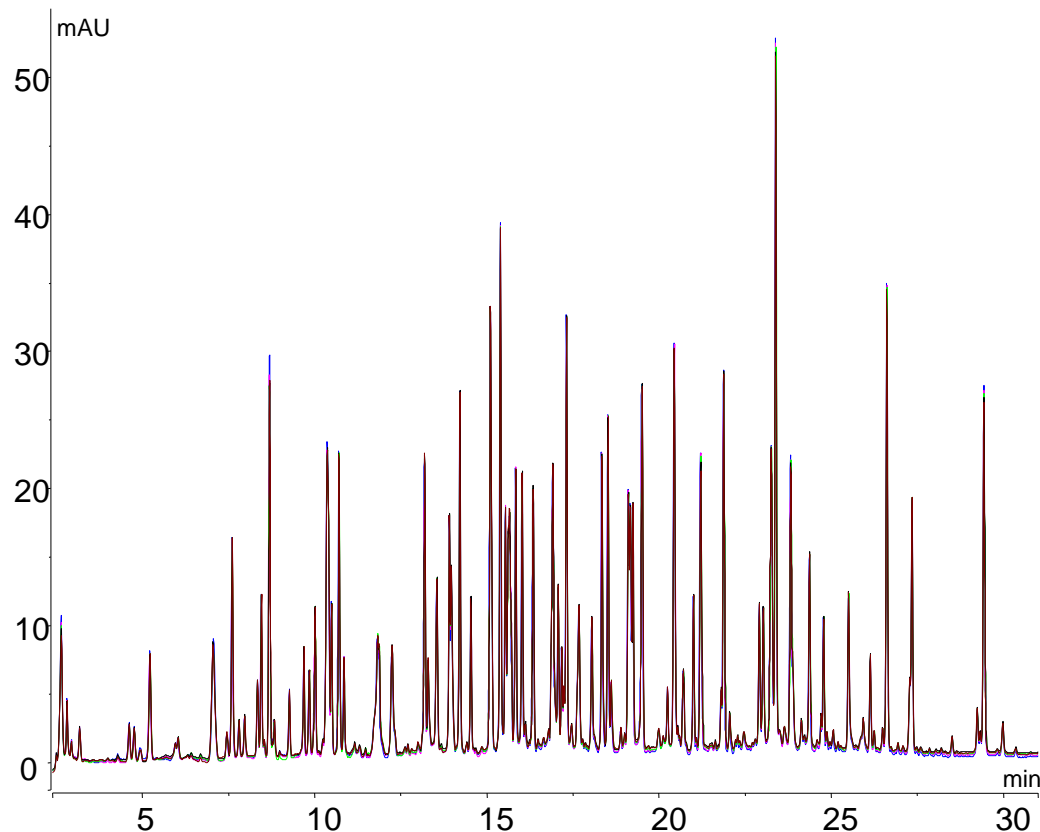
5 Fundamental Workflows

				
<p>Peptide mapping</p>	<p>Aggregate analysis</p>	<p>Charge variant analysis</p>	<p>Intact protein analysis</p>	<p>Glycan analysis</p>
<p>Reversed Phase</p>	<p>SEC HIC</p>	<p>IEX</p>	<p>RP HIC</p>	<p>HILIC Mixed Mode</p>
<p>Confirm sequence</p>	<p>Check monomer vs Aggregates</p>	<p>Check charge variation within antibody sample</p>	<p>Check purity of the antibody</p>	<p>Check glycan presence and structure</p>
<p>UV and UV-MS</p>	<p>UV (UV-MS)</p>	<p>UV</p>	<p>UV and UV-MS</p>	<p>FLD, FLD-MS, CAD</p>
<p>Analytical reproducibility Peak capacity</p>	<p>High salt condition, biocompatible, low dispersion, reproducibility</p>	<p>Biocompatible selectivity</p>	<p>Biocompatible, gradient and thermostating capabilities</p>	<p>Gradient capabilities</p>

1. Peptide Mapping



High retention time precision with the Thermo Scientific™ Acclaim™ column (n=5)

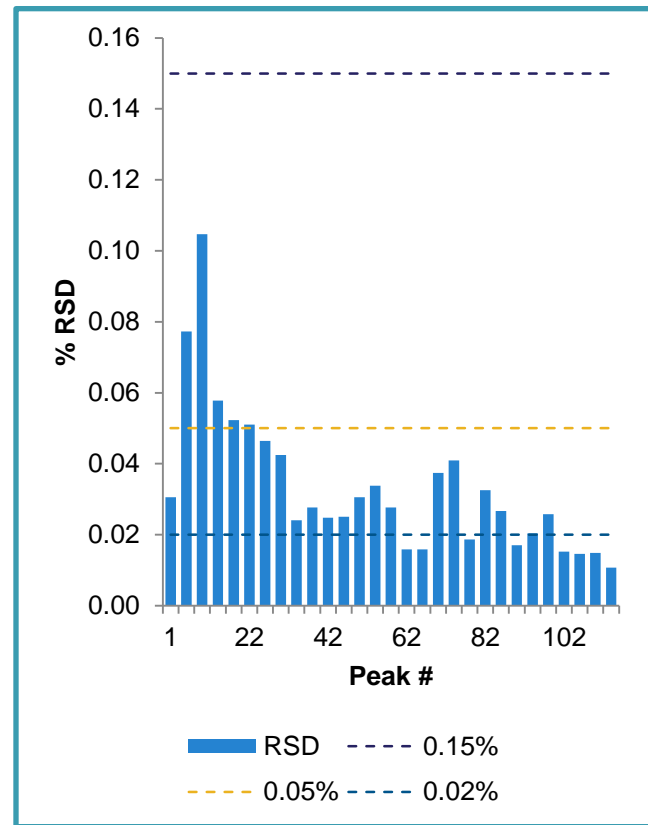
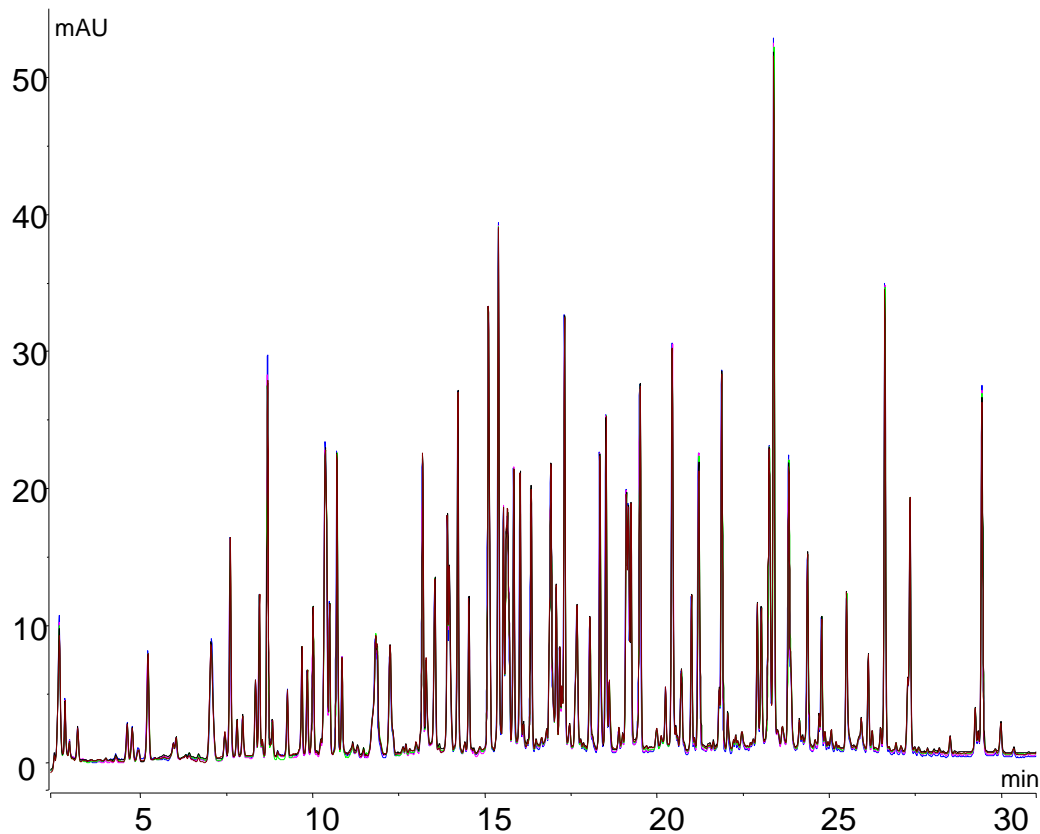


- Very high precision of both retention time and peak area
- Excellent separation in 30 minute gradient
- Active eluent pre-heating to avoid any thermal mismatch

1. Peptide Mapping



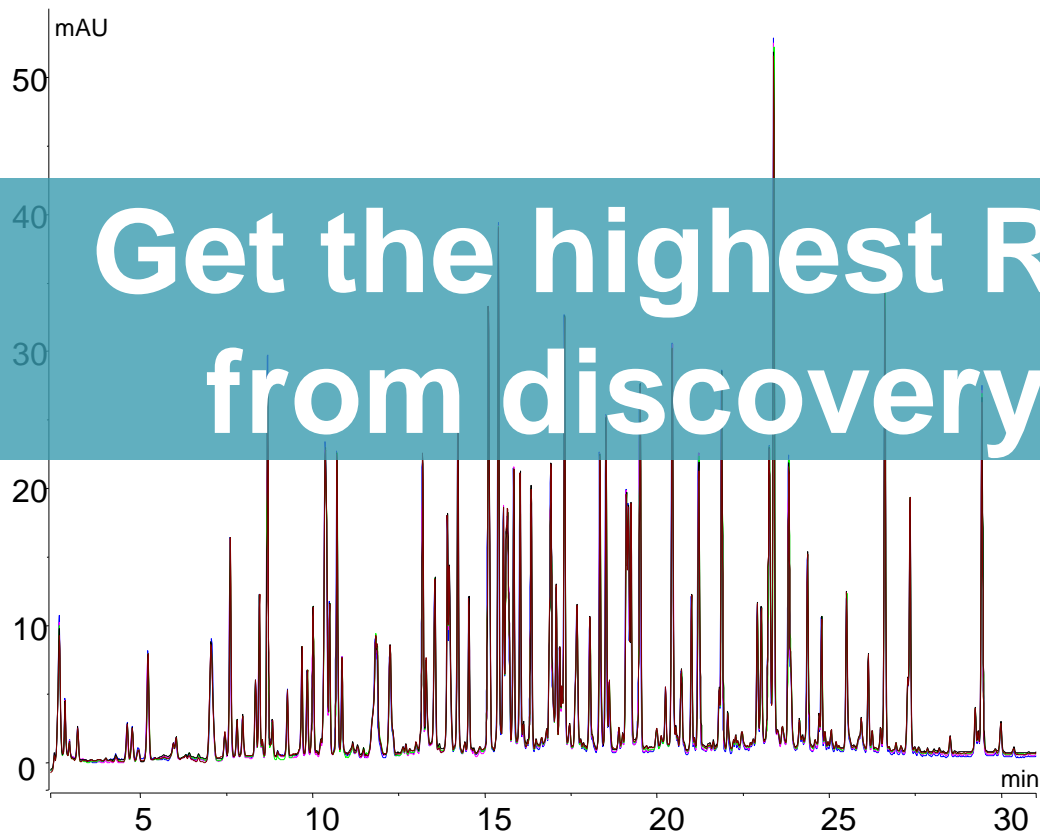
High retention time precision with the Thermo Scientific™ Acclaim™ column (n=5)



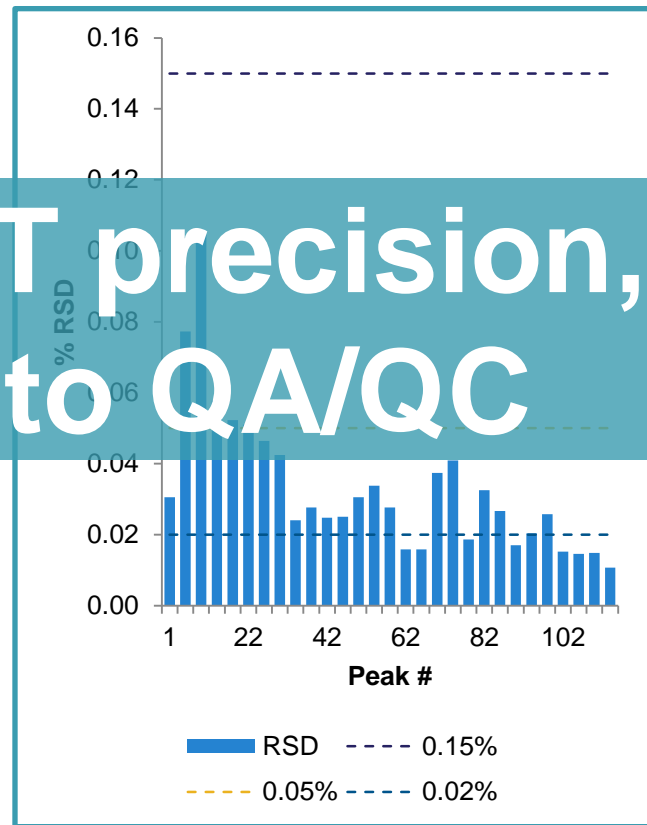
1. Peptide Mapping



High retention time precision with the Thermo Scientific™ Acclaim™ column (n=5)



Get the highest RT precision, from discovery to QA/QC

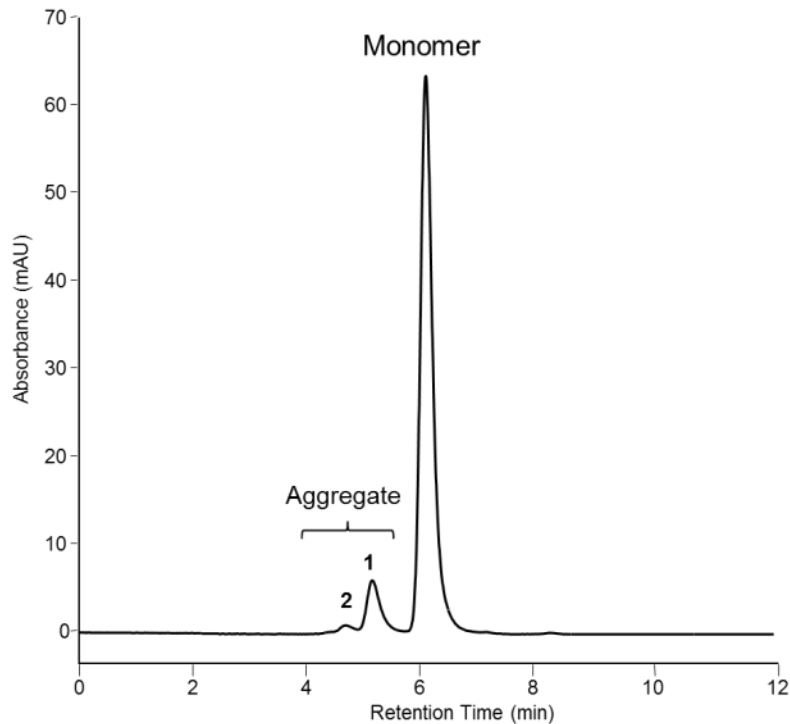


2. Aggregate Analysis



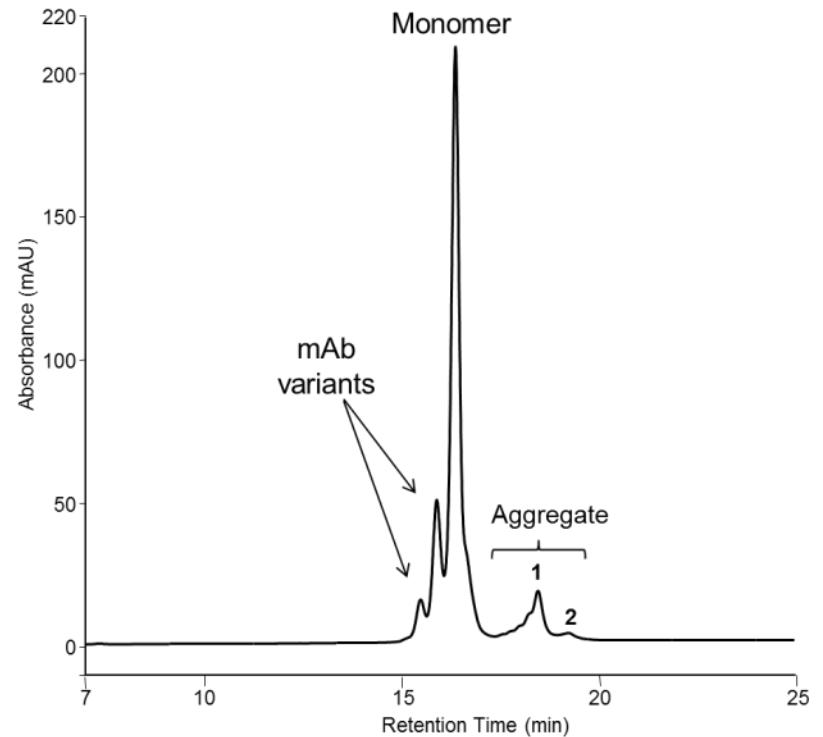
Aggregate separation of a mAb on the Thermo Scientific™ MAbPac™ SEC-1 and HIC-10 columns

MAbPac SEC-1 4.0 x 150mm



Fast aggregate analysis

MAbPac HIC-10 4.6 x 100mm



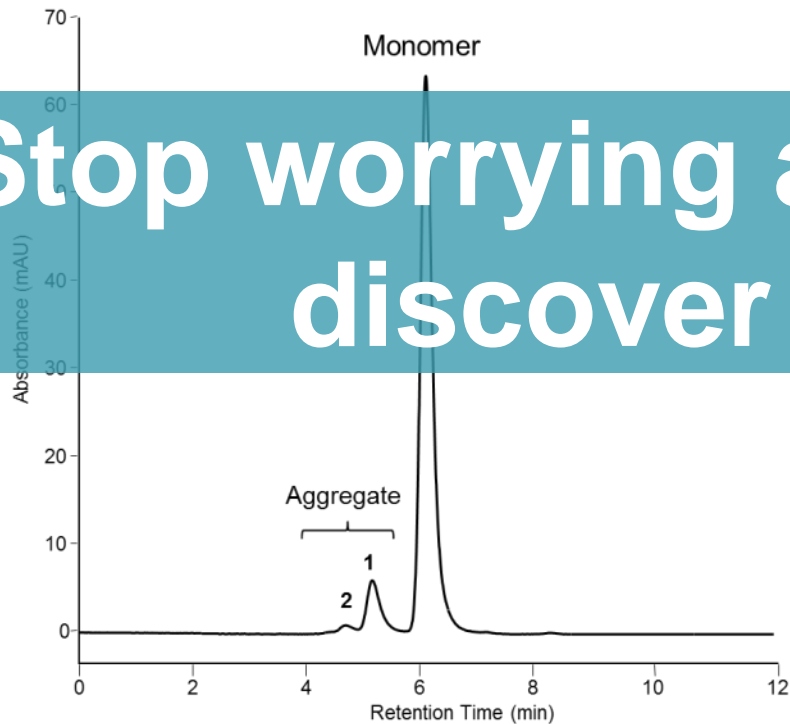
Aggregate analysis with additional information

2. Aggregate Analysis



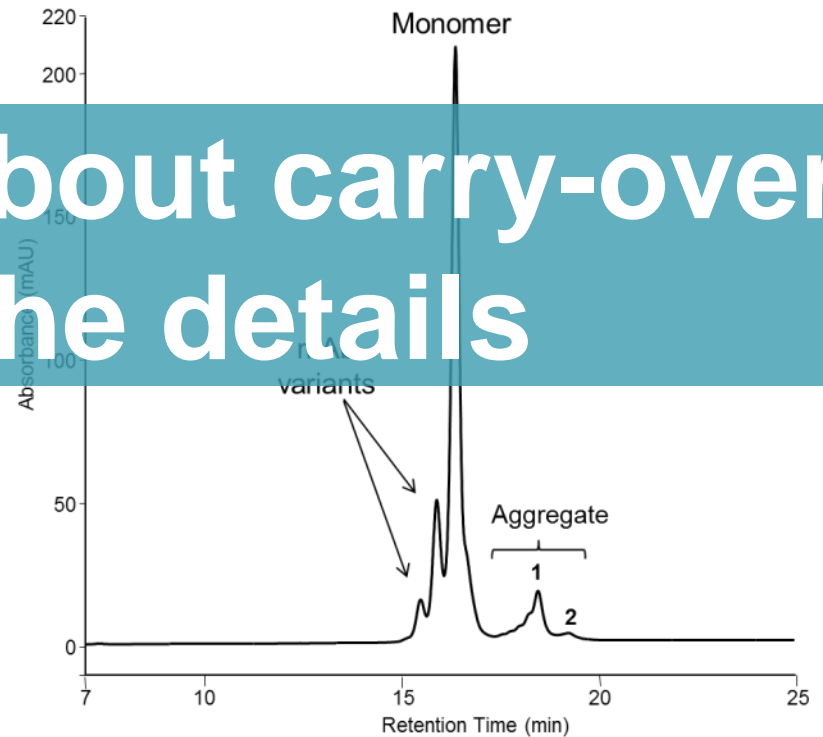
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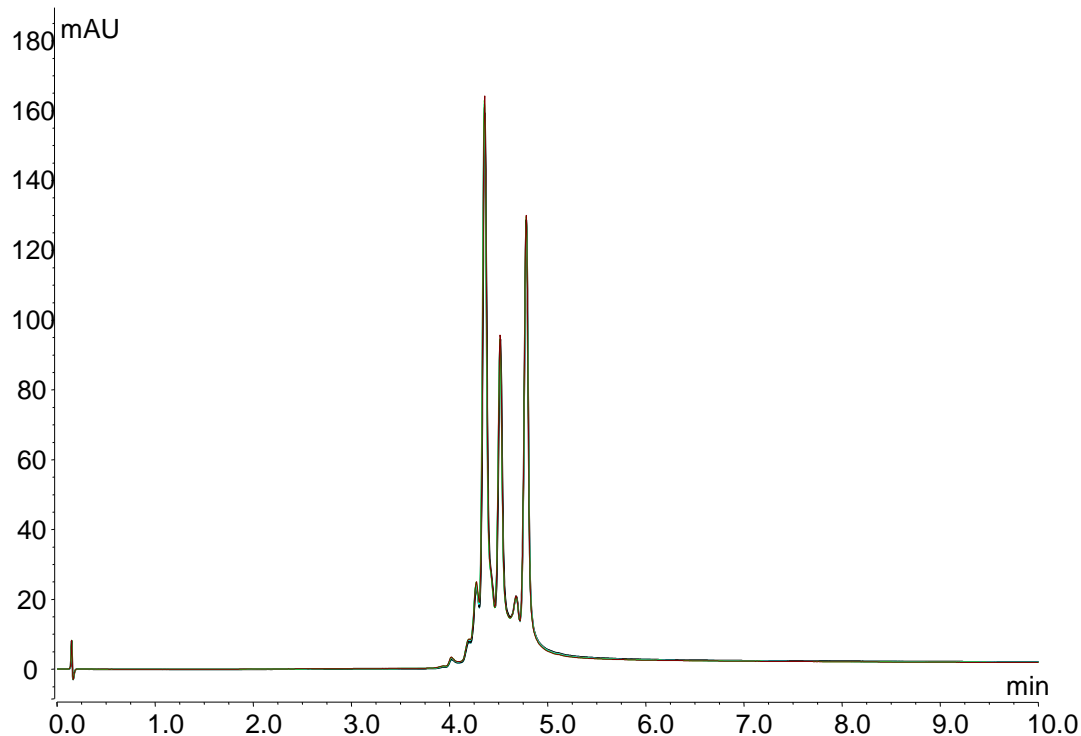
Aggregate analysis with additional information

Stop worrying about carry-over,
discover the details

3. Charge Variant Analysis



Charge variant analysis of a mAb by pH gradient on the Thermo Scientific™ MAbPac™ SCX column
(overlay of six runs)

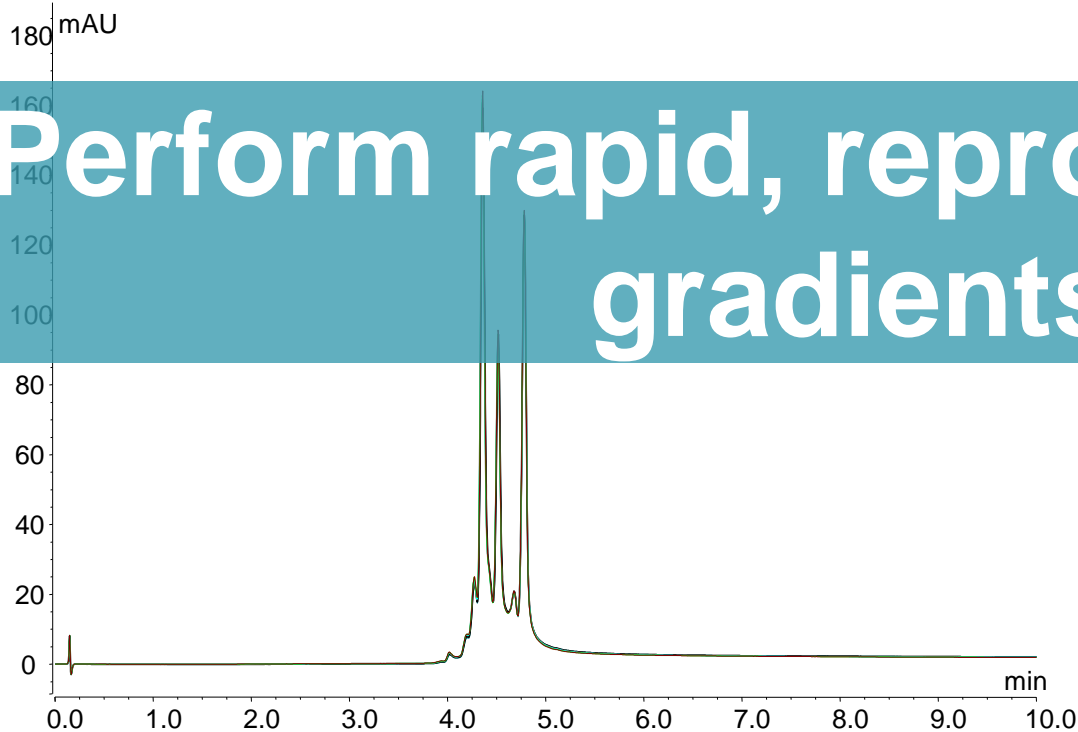


- pH Gradients allow generic gradients for the separation of mAbs with a range of isoelectric points
- Dedicated buffer kit allows easy method set-up
- Easy to optimize to increase sample through-put

3. Charge Variant Analysis



Charge variant analysis of a mAb by pH gradient on the Thermo Scientific™ MAbPac™ SCX column
(overlay of six runs)



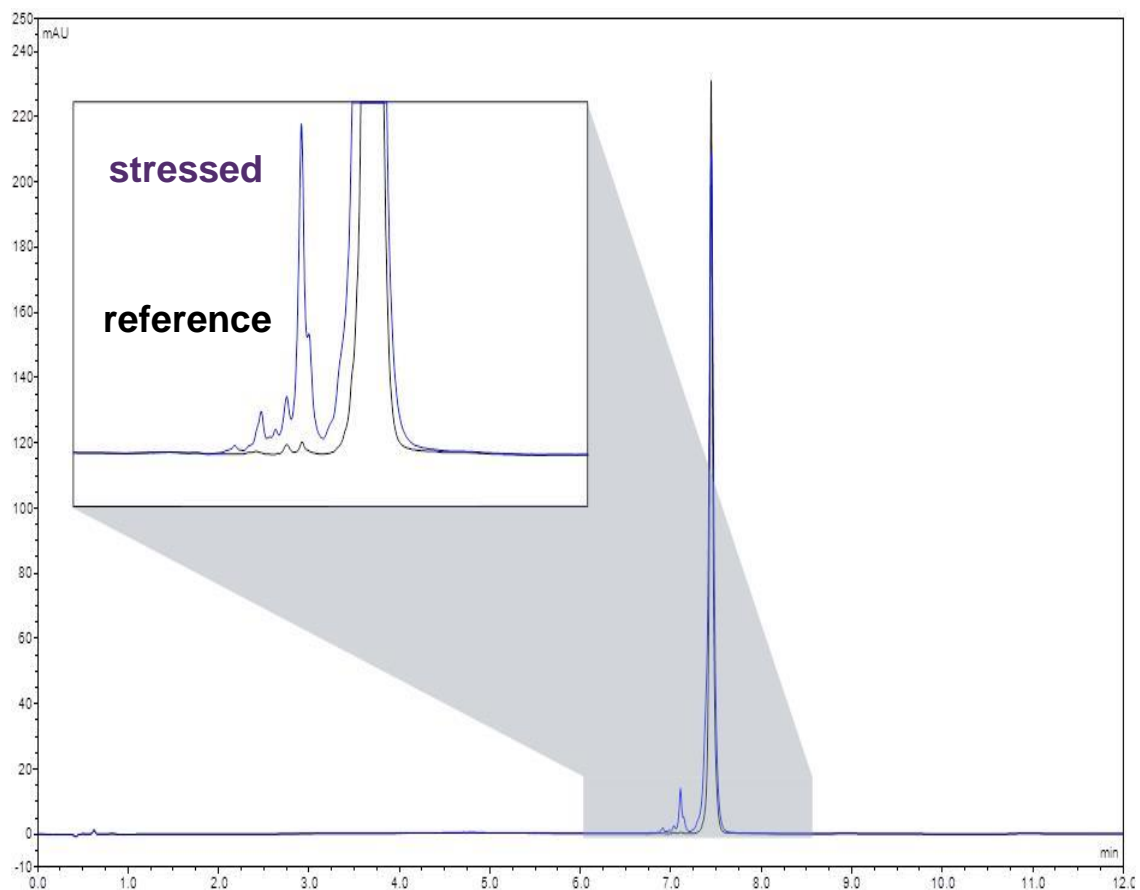
Perform rapid, reproducible pH gradients

- pH Gradients allow generic gradients for the separation of mAbs with different isoelectric points
- Dedicated buffer kit allows easy method set-up
- Easy to optimize to increase sample through-put

4. Intact Protein Analysis



Separation of reference and stressed intact mAb on the Thermo Scientific™ MAbPac™ RP column

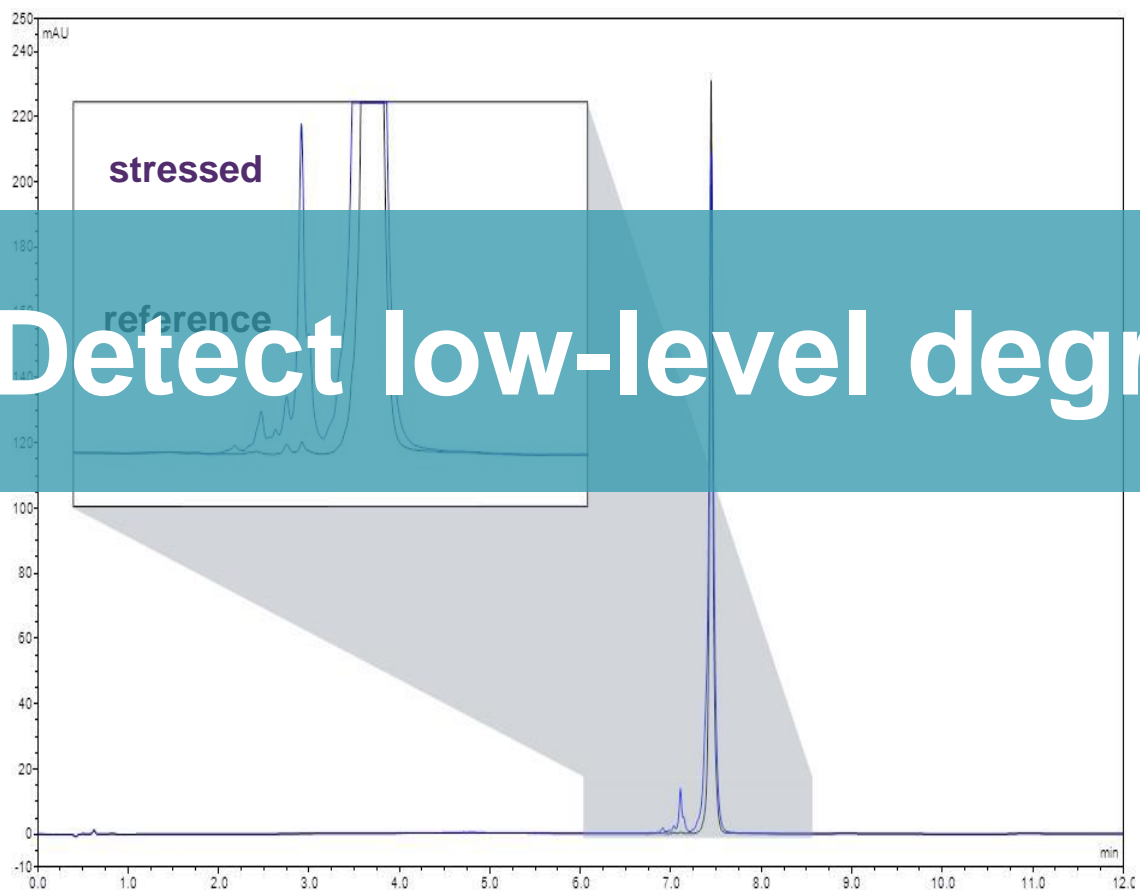


- Fast method for stability evaluation of intact antibodies
- Boosted separation performance through extended temperature range
- Highly efficient separation of intact antibodies and degradation products

4. Intact Protein Analysis



Separation of reference and stressed intact mAb on the Thermo Scientific™ MAbPac™ RP column



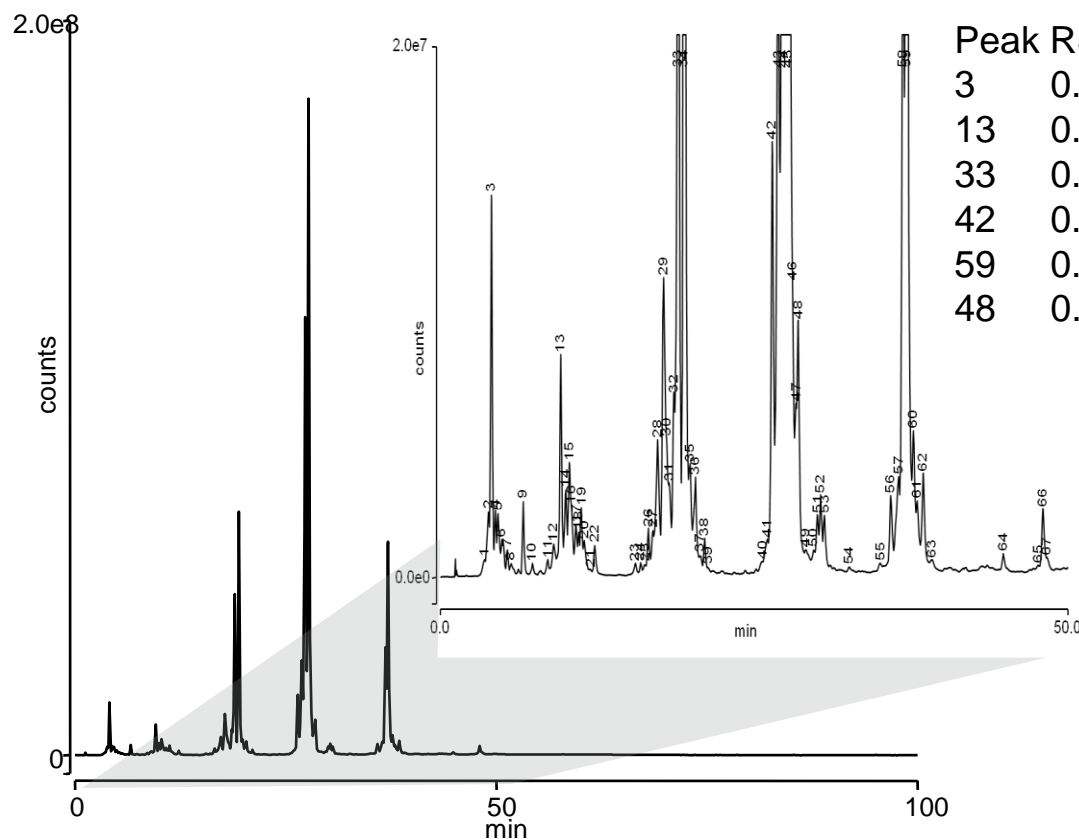
Detect low-level degradants, fast

- Fast method for stability evaluation of intact antibodies
- Boosted separation of mAb fragments through extended temperature range
- Highly efficient separation of intact antibodies and degradation products

5. Glycan Analysis



2 AB-labeled glycans separated on the Thermo Scientific™ GlycanPac™ AXR-1 column, Vanquish Flex with fluorescence detection

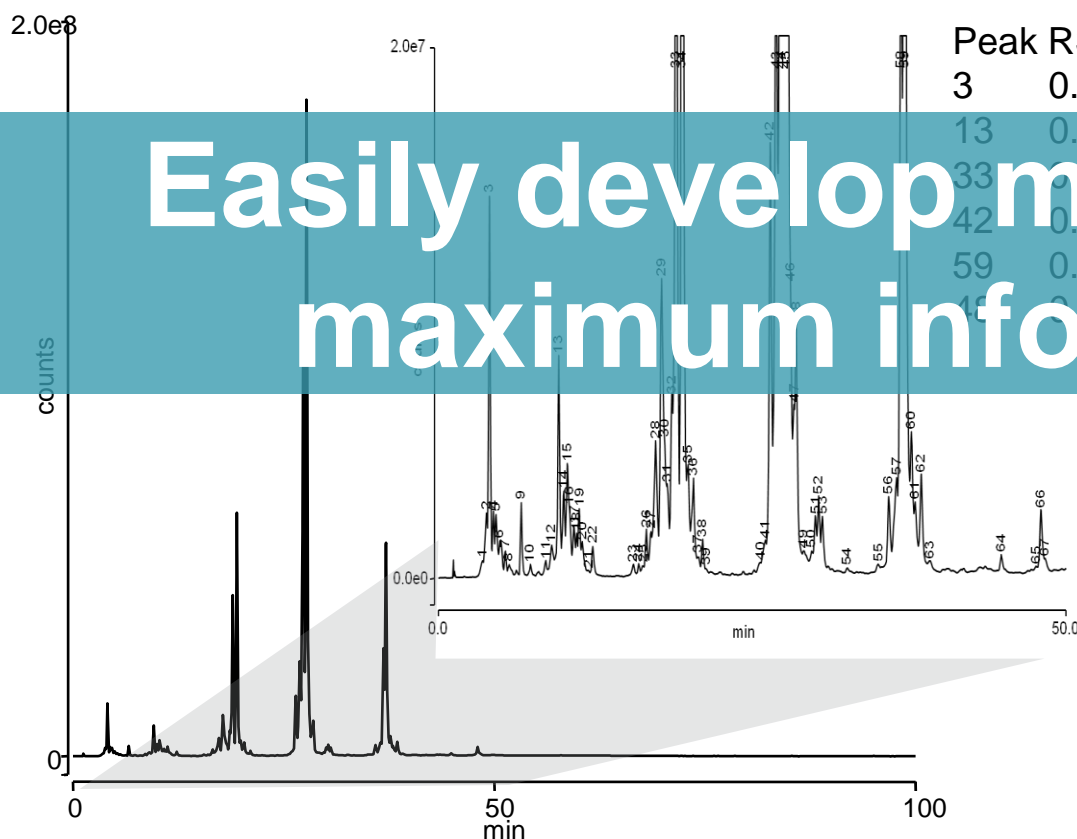


- Ternary gradient for mixed mode separation
- More than 60 peaks detected
- Average retention time RSD well below 0.1%

5. Glycan Analysis



2 AB-labeled glycans separated on the Thermo Scientific™ GlycanPac™ AXR-1 column, Vanquish Flex with fluorescence detection



Easily develop methods for maximum information

- Average retention time RSD well below 0.1%

Summary

Built to exacting standards, **specifically for biopharma**

Simply, you can have the most **versatile, high performance UHPLC** that gives you more **confidence** in your results

Unlock total **workflow** solutions for peptide mapping, glycans, intact protein analysis, charge variant profiling and aggregate analysis



Thank you

