

QUANTUM SI™

Quantum Si

Investor & Analyst Day

November 19, 2025



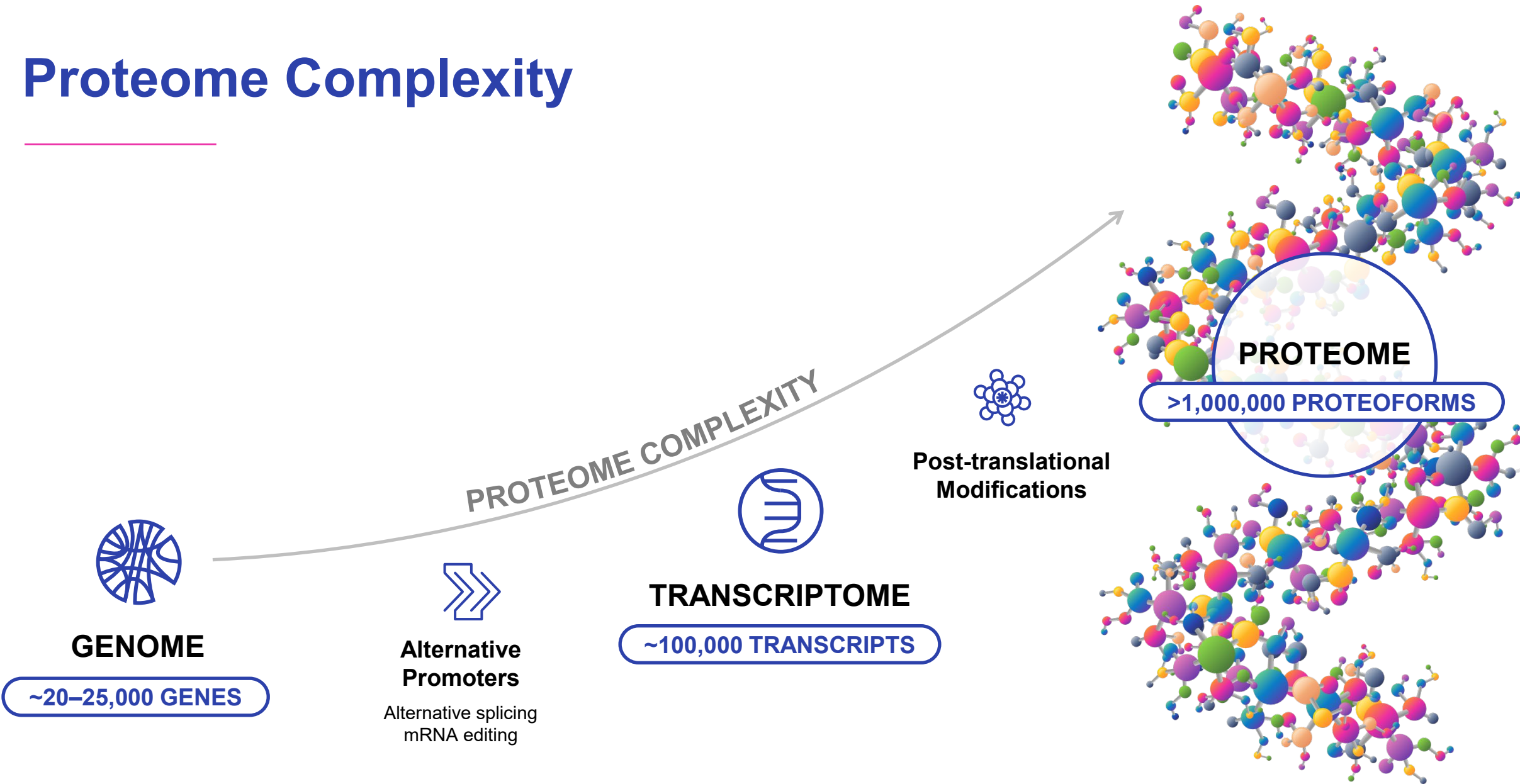
Investor Day Agenda

Jeff Hawkins, CEO	Tackling the Complexity of the Proteome	10:00–10:10 AM
Todd Rearick, CTO	Proteus Program Update and Long-term Technology Roadmap	10:10–10:40 AM
John Vieceli, CPO	The Path to Detecting All 20 Amino Acids	10:40–11:05 AM
Brian Reed, Head of Research	Post-translational Modification Analysis Solutions	11:05–11:25 AM
Jeff Hawkins, CEO	The Road to Proteus Launch	11:25–11:45 AM
Management	Q&A Session	11:45 AM–Noon

Proteins Are the Core of Biological Discoveries Across Many End Markets



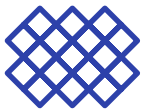
Proteome Complexity



The Study of Proteoforms Extends to Many Disease Areas and Thousands of Unique Proteins



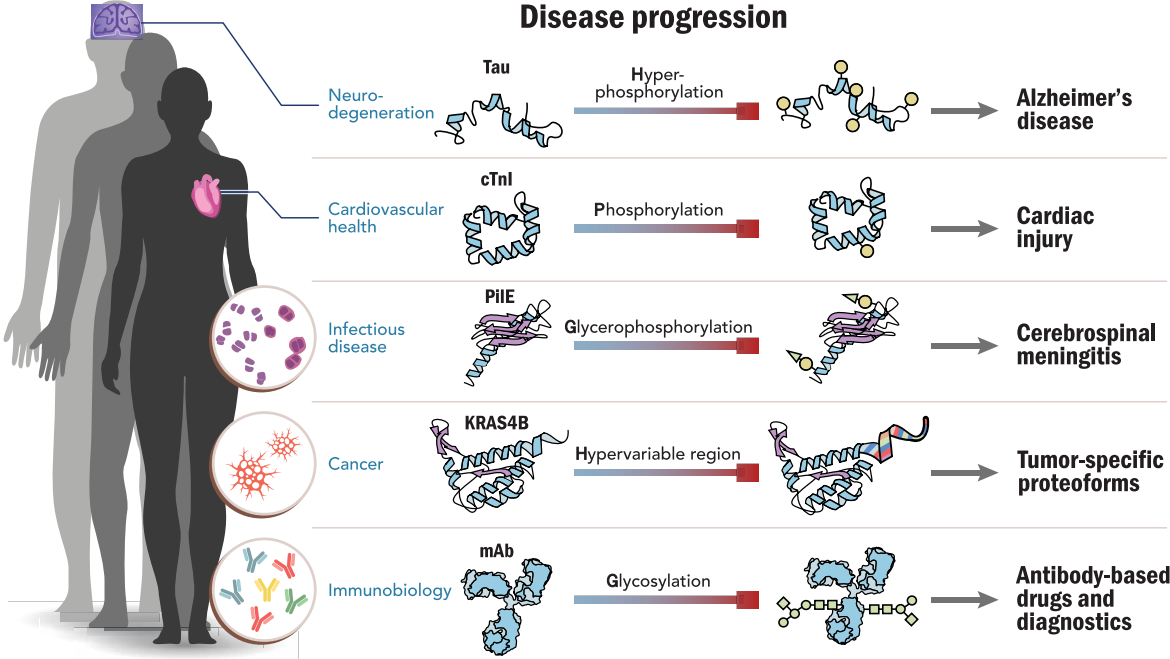
Affinity-based methods cannot scale to this complexity



Complete coverage of the proteome would require hundreds of thousands or more unique, site-specific affinity reagents

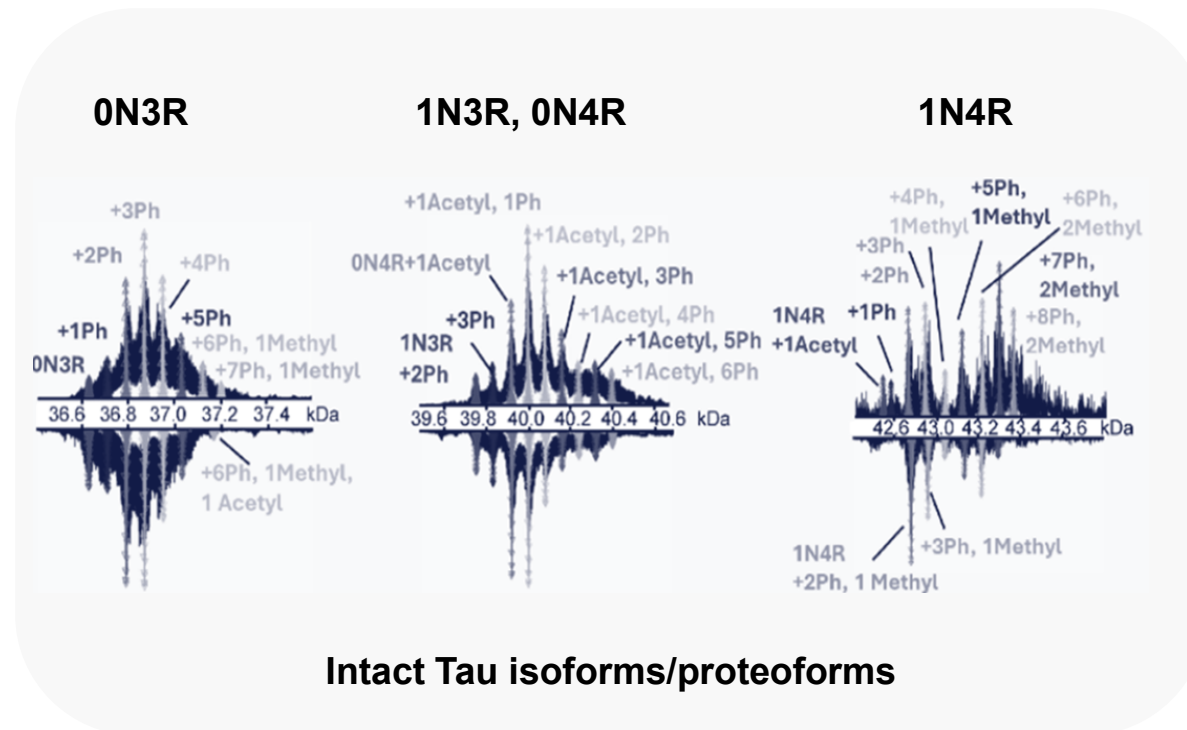
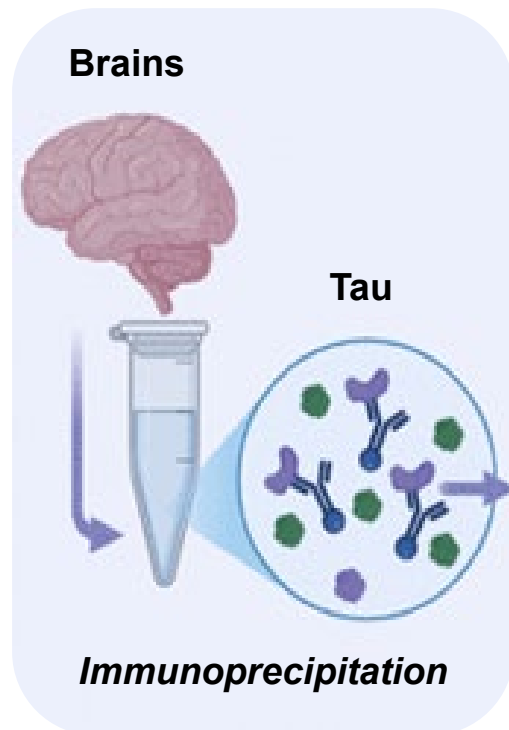


Only single-molecule protein sequencing can tackle this complexity

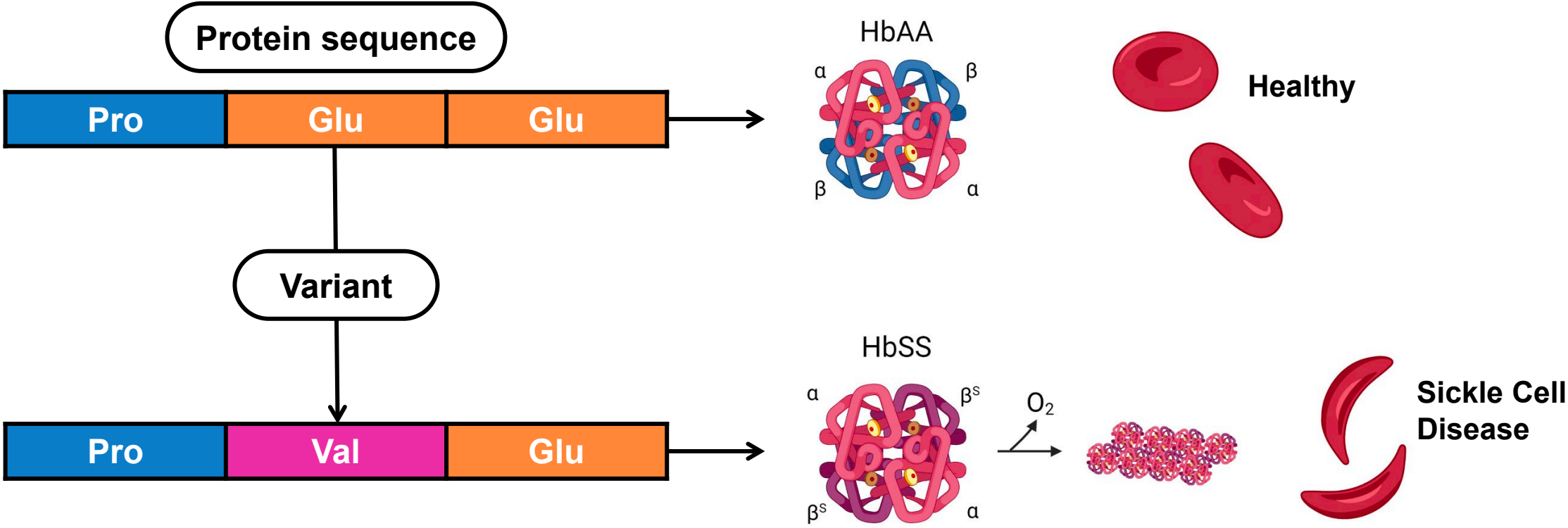


Proteoforms Are Not Limited to a Single PTM Type

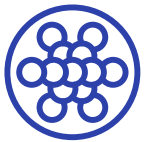
They are far more diverse, even within a single protein



Proteoforms Also Include Single Amino Acid Variants, Which Can Be Critical to Understanding Disease



Specialized Platforms With High Capital Costs Limit Adoption Outside of Core Labs in Proteomics



Many specialized platforms needed to fully interrogate the proteome



Technical tradeoffs when selecting between the breadth of protein coverage and depth of insights



High capital costs with the top end instruments costs \$1M or more each



Manual laboratory and data analysis workflows limit the number of laboratories capable of performing proteomics



Moving Beyond the Core Lab: Proteus Will Enable Deep Protein Analysis and Accelerate the Field of Proteomics



Single-molecule protein sequencing will be the most versatile technology in proteomics — single AA variants, broad PTM coverage, and protein-agnostic



Automation simplifies laboratory workflow, increases throughput, and minimizes the need for specialized staff



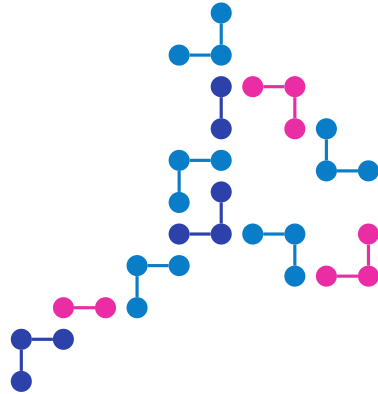
Affordable, allowing any lab — anywhere — to be a proteomics core lab



Themes of Today's Presentations



Proteus performance data and long-term technology roadmap



The path to detecting all 20 amino acids



A diverse set of tools to enable generalizable PTM analysis



Road to Proteus launch and 2026 milestones

QUANTUM SI™

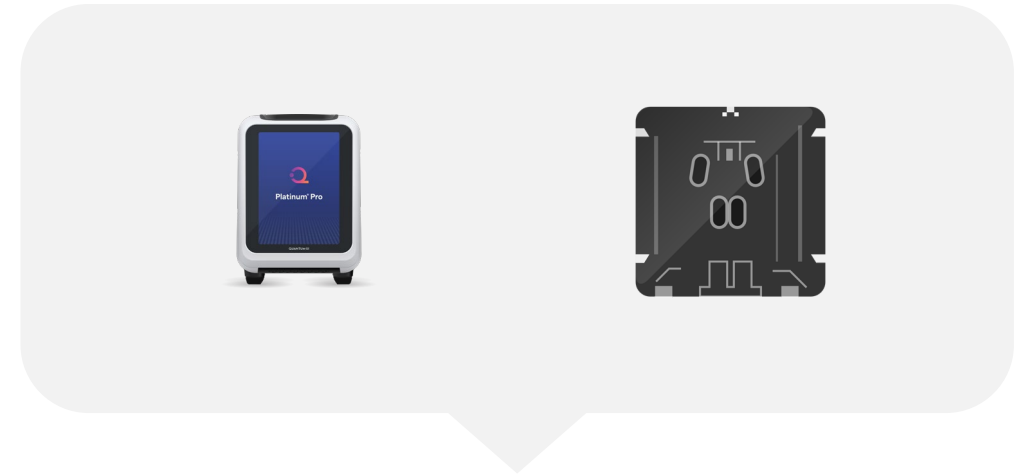
Proteus™ Program Update



Proteus Next-generation Architecture

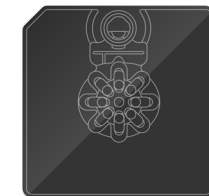
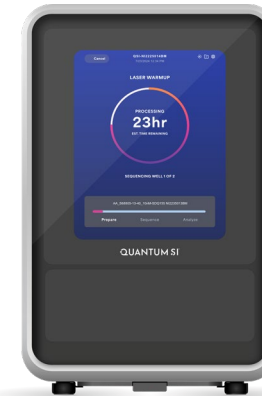
Platinum[®] Pro + 2M Chip

- Integrated semiconductor consumable
- Benchtop instrument with manual workflow



Proteus[™] + KinetIQ[™] Array

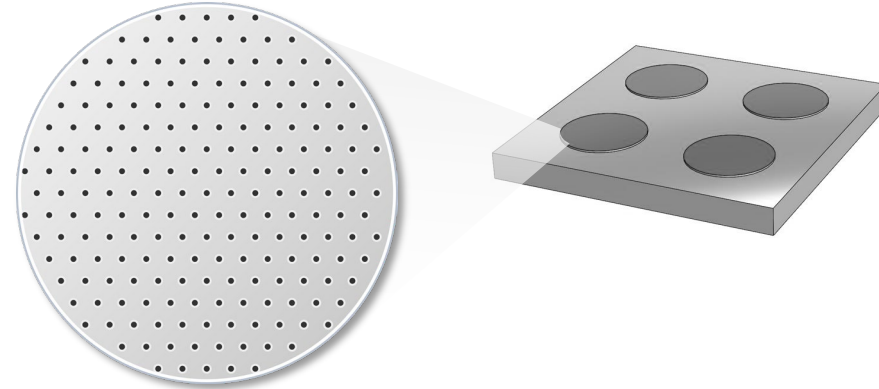
- Simple, passive consumable
- Benchtop instrument with imaging system
- Workflow automation



KinetIQ™ Array

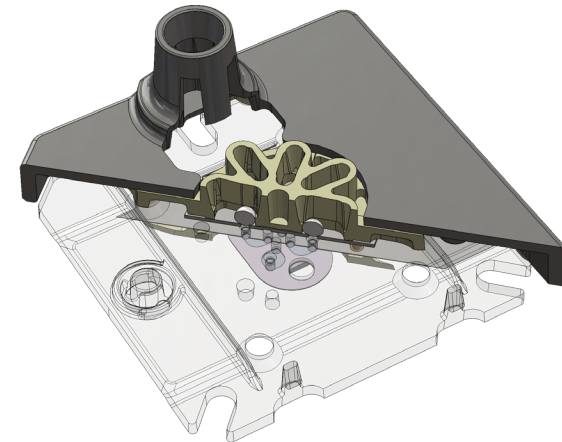
Simple, passive consumable

- Low-cost fused silica die
- 80M wells per device
- Architecture scales to billions of wells

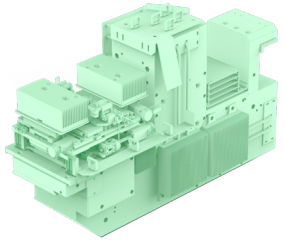


Simple packaging

- Inexpensive plastic assembly
- Four flow cells, each with 20M wells
- Features to support automation

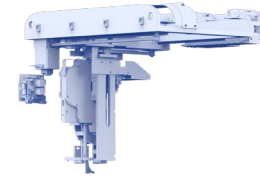


Proteus Instrument



Optical module

- High-performance custom optical design
- High resolution and large field of view
- Supports simple passive consumable



Liquid handling

- Full workflow automation
- More advanced workflows, deeper insights

Proteus Program Status



Key technical risks retired or substantially reduced



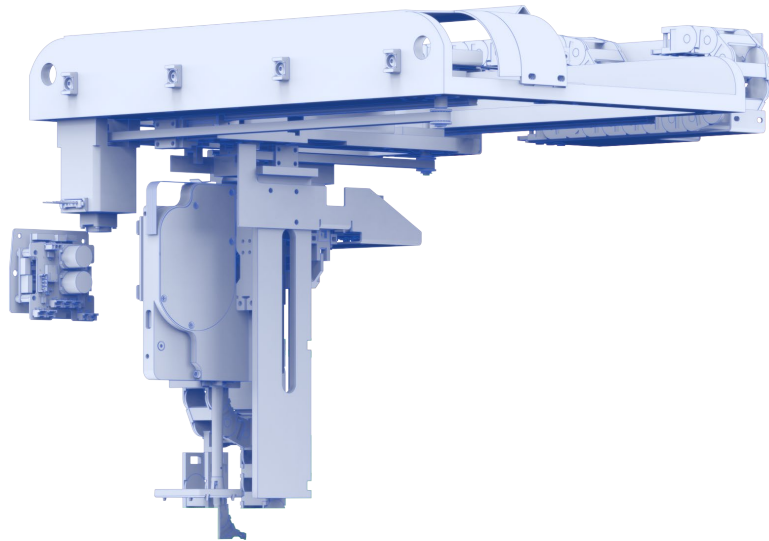
Critical system components matured through several prototypes



Integrated system design complete — building first systems now

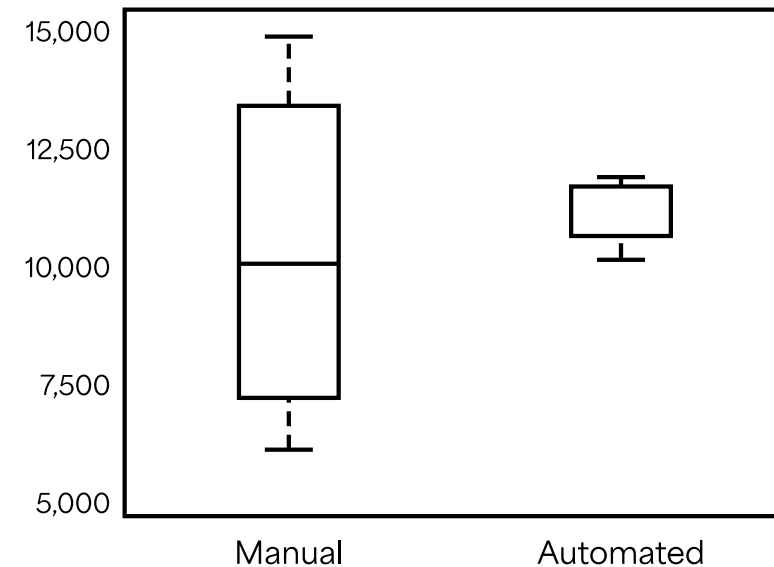
Sequencing Workflow Automation is More Reproducible Than Current Manual Workflow

Integrated System Liquid Handling



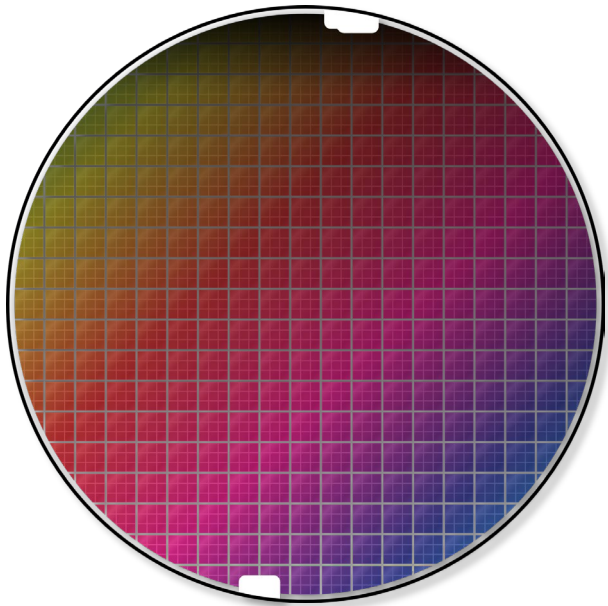
Prototype Liquid Handling Subsystem Data

Automated vs manual workflow alignments



- Same architecture as integrated product design
- Entire sequencing workflow fully automated

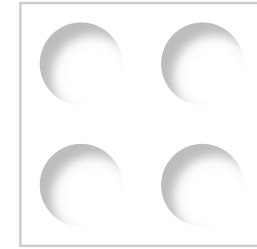
KinetIQ Array Fabrication and Post-processing Processes are Established



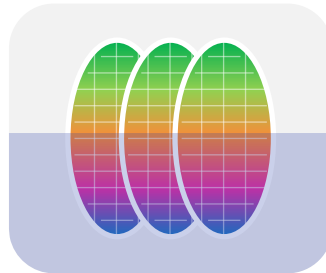
Wafer fabrication process established



Well structure optimized



Product intent die size + geometry



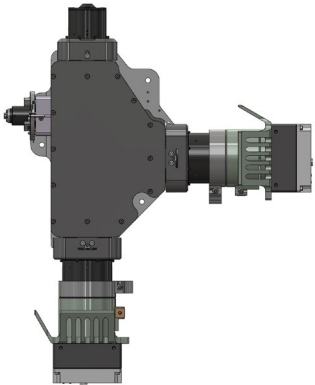
Wafer-scale post-processing



Efficient packaging process

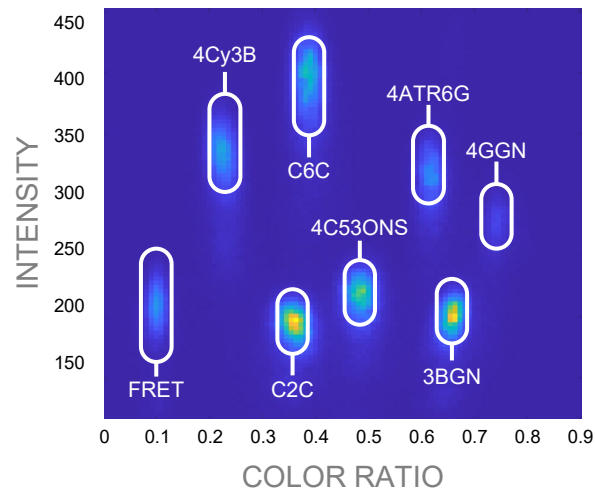
Data from Prototype Imaging System and New Dyes Fully Validates Transition from Lifetime to Color Ratio

Fully Functional Imaging System



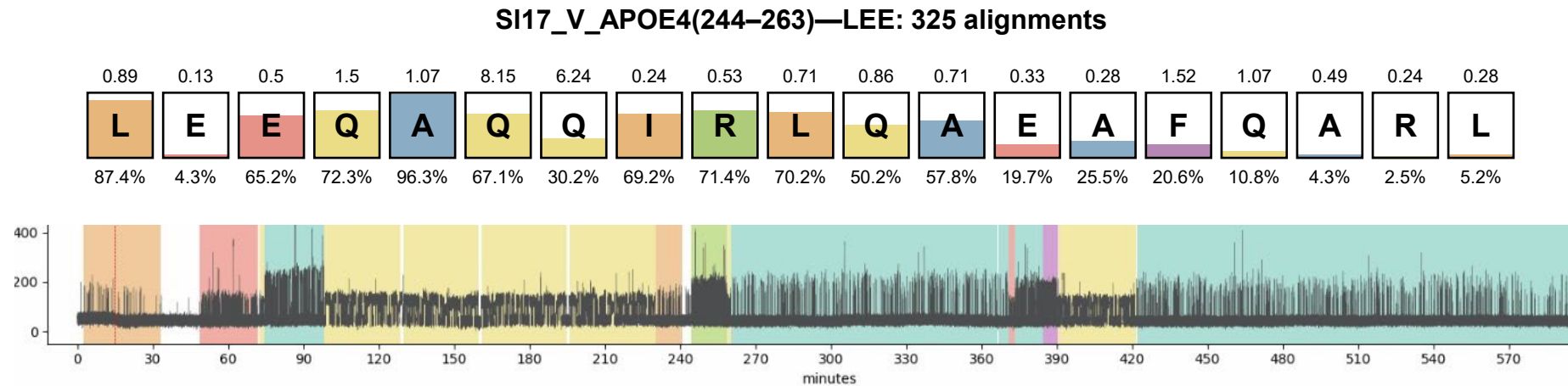
- Same architecture as product design
- Commercial off-the-shelf components
- Product-intent image sensors
- Reduced field of view

Proven Color Channel Detection



- New color-space dye set
- Demonstrated up to 8 dyes
- Room for more if needed

Successful Dynamic Sequencing Runs Completed in Q3

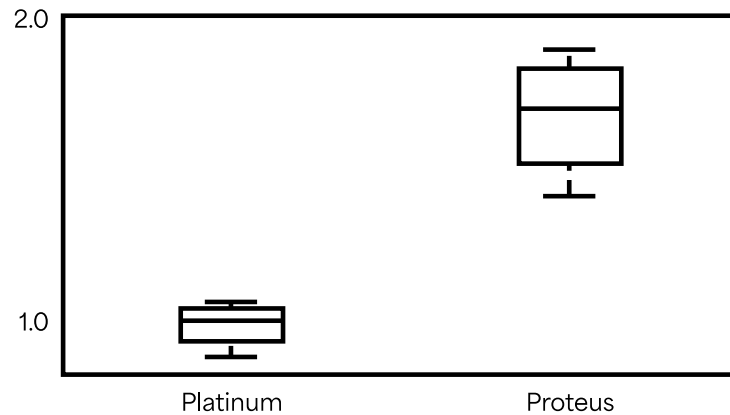


Substantial de-risking new system elements

Consumable, dyes, optical system, software

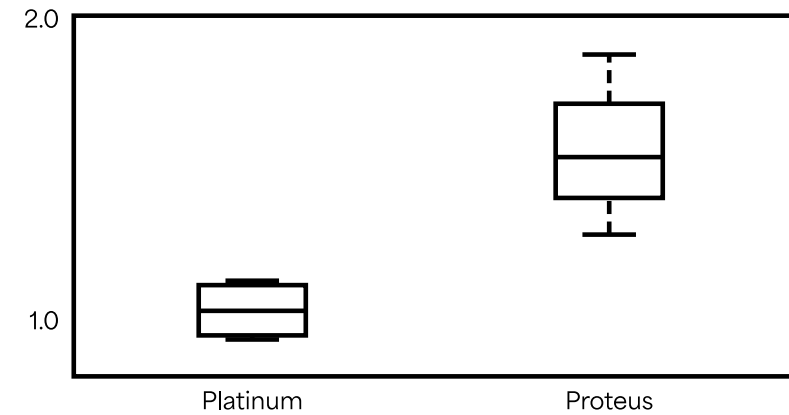
Proteus Has Superior Sequencing Output Per Well Compared to Platinum

Alignments per well (normalized to Platinum)



Proteus routinely produces more alignments with the same number of wells

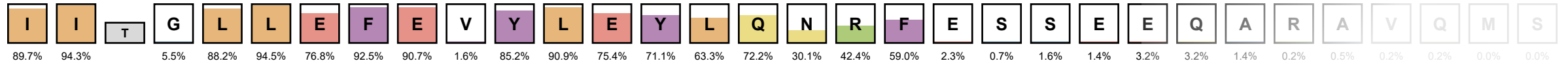
Long-read fraction (normalized to Platinum)



Proteus produces more long alignments compared to Platinum

Proteus Consistently Sequences Deep into Peptides

SI19_V_IL6(87–120)—IIT: 439 alignments



Unique capability for long-range structural information



Access to PTMs and variants deep into reads



Sequencing depth expected to continue to improve with increased coverage and further optimization

Proteus Has Superior SNR and Short Pulse Detection Compared to Platinum

Better SNR

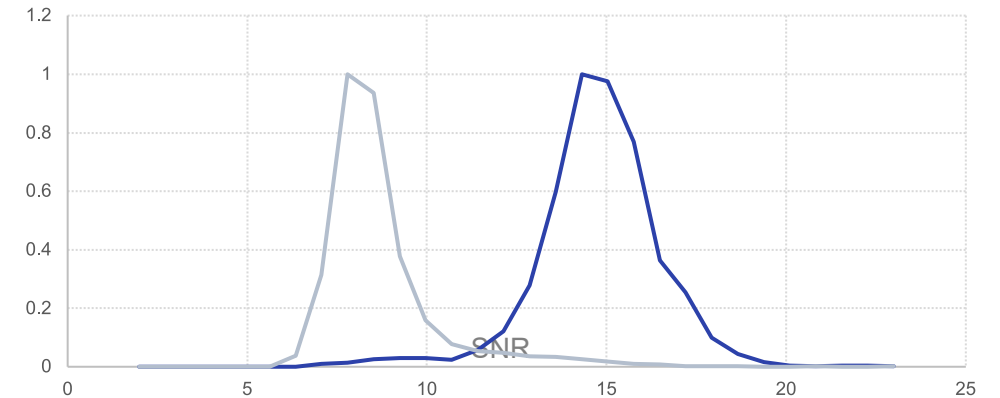
- More high-quality alignments
- Better accuracy
- More sensitive for PTMs and variants

More sensitive short pulse detection

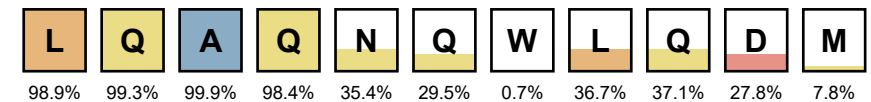
- Increased motif coverage with the same binders
- Software not optimized for improved data

Average SNR per wells

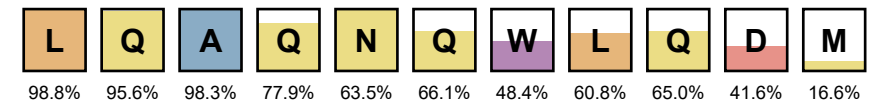
● Platinum ● Proteus



Platinum



Proteus



Proteus Sequencing Performance is on Track to Far Exceed Platinum at Launch



Proteus data is already superior to Platinum data



Data generated to date is without optimization

Current algorithms | Current V4 binder set | Current cutters and chemistry



Additional improvements expected before launch

Integrated System in Development

First Integrated System Expected 1Q26

- Full integration of imaging and workflow automation
- Product-like consumables
- Full field of view supporting 20M wells



Proteus Program Summary



Transition to new architecture is proven — team is executing towards product launch for YE2026



Proteus architecture shows significant improvement over Platinum in the quantity and quality of sequencing output



Platform launch is aligned with improvements in biochemistry and library prep that will drive additional performance gains

Long-term Technology Roadmap



Proteus Architecture Supports Our Long-term Platform Roadmap Requirements



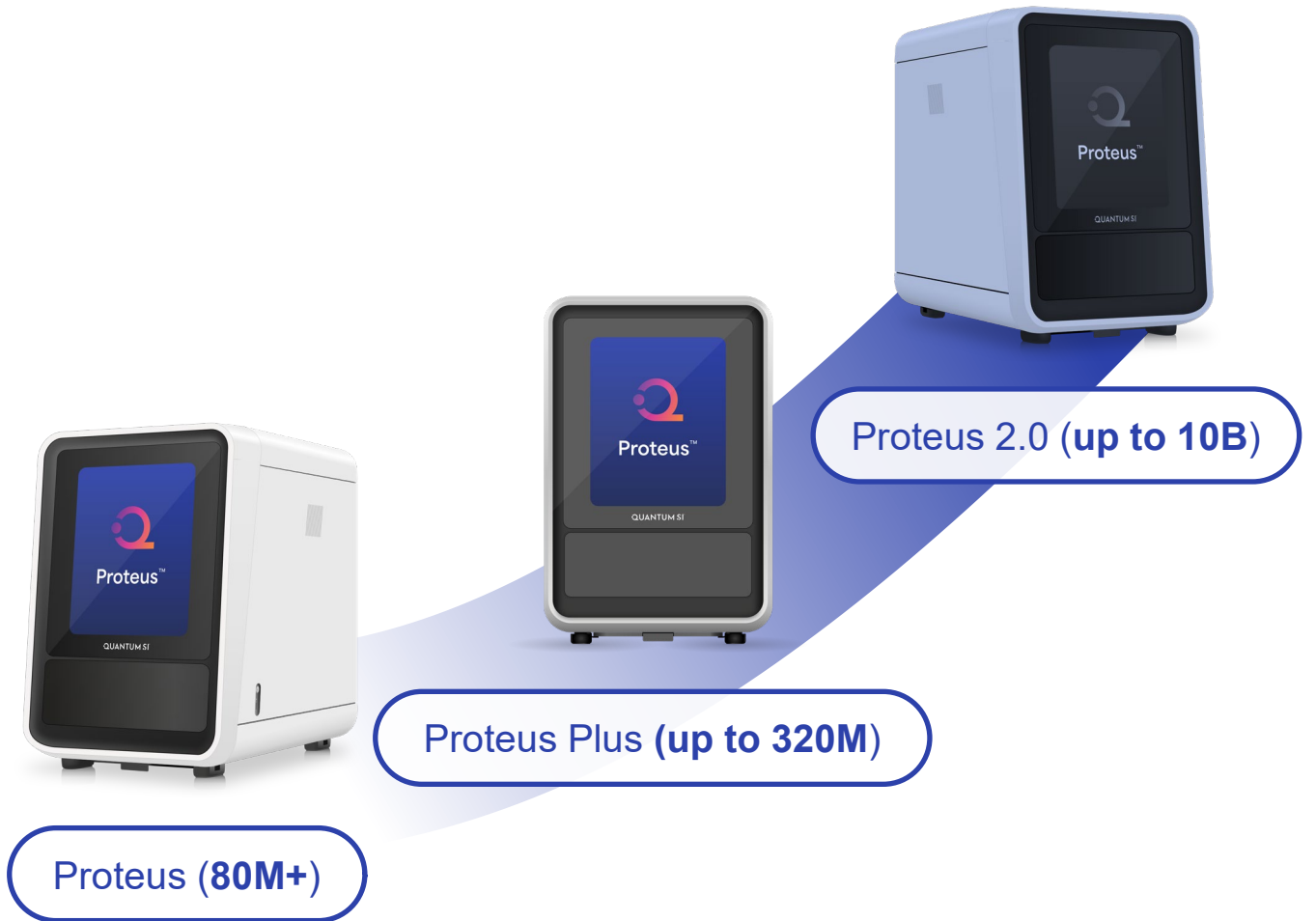
Consumable architecture
scales to billions of wells



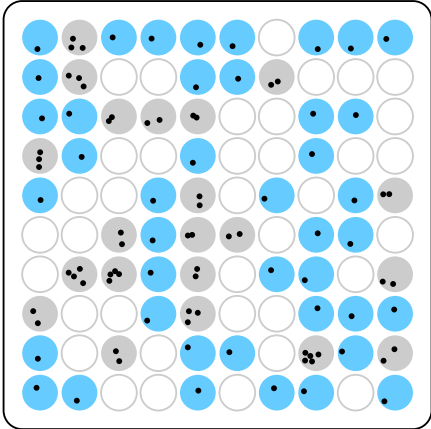
10× scaling from assay
improvements alone



Future instruments
capable of up to 10B reads

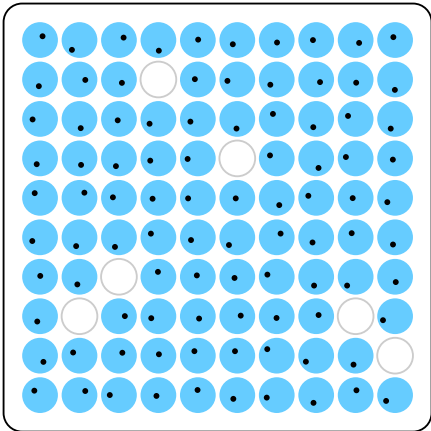


Super Poisson Loading Increases Sequencing Output per Run by Approximately 3×



Poisson Loading

- Peptides randomly loaded into wells
- Maximum single-molecule loading ~36%
- 64% of wells are empty or multiply-loaded



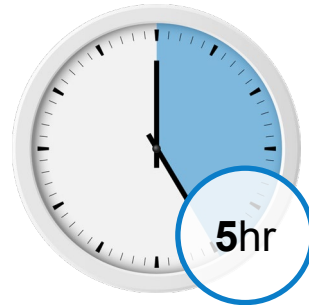
Super Poisson Loading

- Peptides are loaded in a way that prevents multiple loading
- Only one peptide can be loaded in most wells

Faster Sequencing Roadmap + Field Upgrades Could Drive Output Up to 320M and Increase Samples per Run



Proteus (80M)



160M



320M



Proteus Plus (up to 320M)

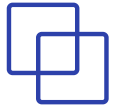
Sequencing time reductions allow more chips to be run in same timeframe as original 80M

Upgrade to drawer/stage and consumable to increase chips/run

We Have Successfully Demonstrated a Controlled Cleavage Version of Our Sequencing Chemistry



Enables scanning system



Amino acid boundaries are known

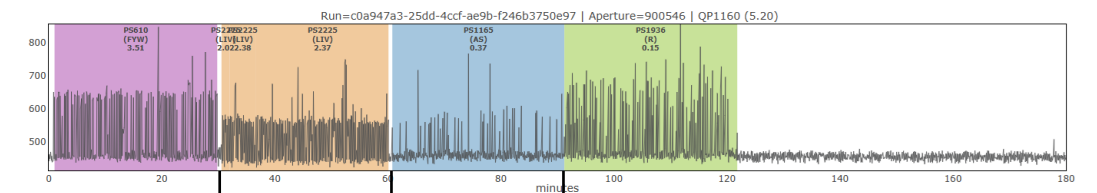
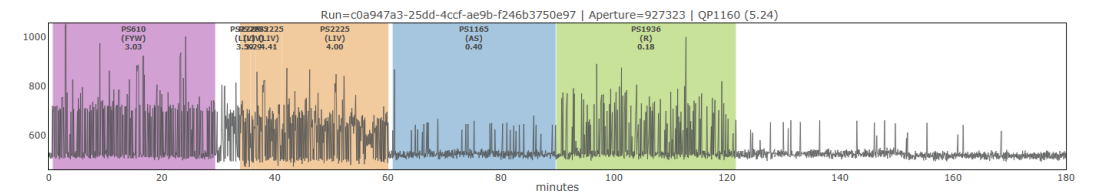
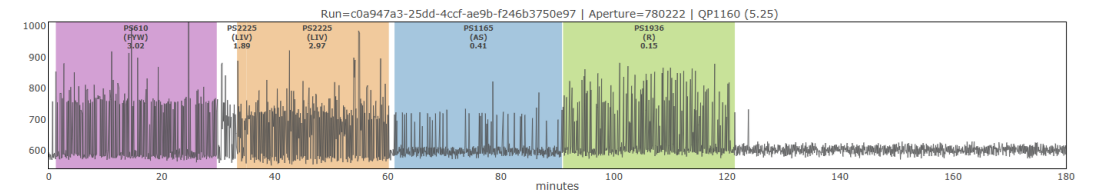


Residue duration is controlled and uniform



Time/residue is much faster on average

Controlled Cleavage Chemistry



Defined Cutting Points

Combining Controlled Cleavage with High-speed Scanning Scales the Architecture to Billions of Reads

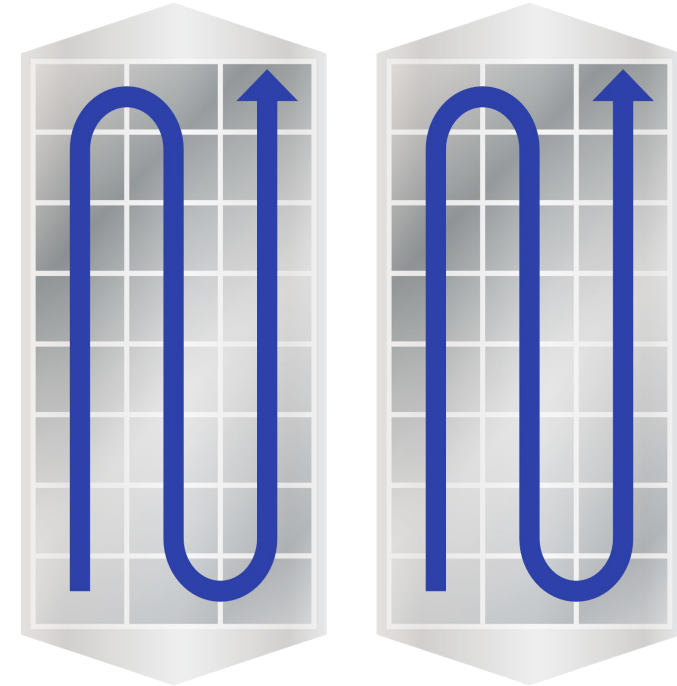
Proteus 2.0 can incorporate high-speed scanning and microfluidic delivery system

Scanning system enables billions of reads

Multiple imaging locations within one flow cell

Efficient usage of device area

Enabled by controlled cleavage chemistry



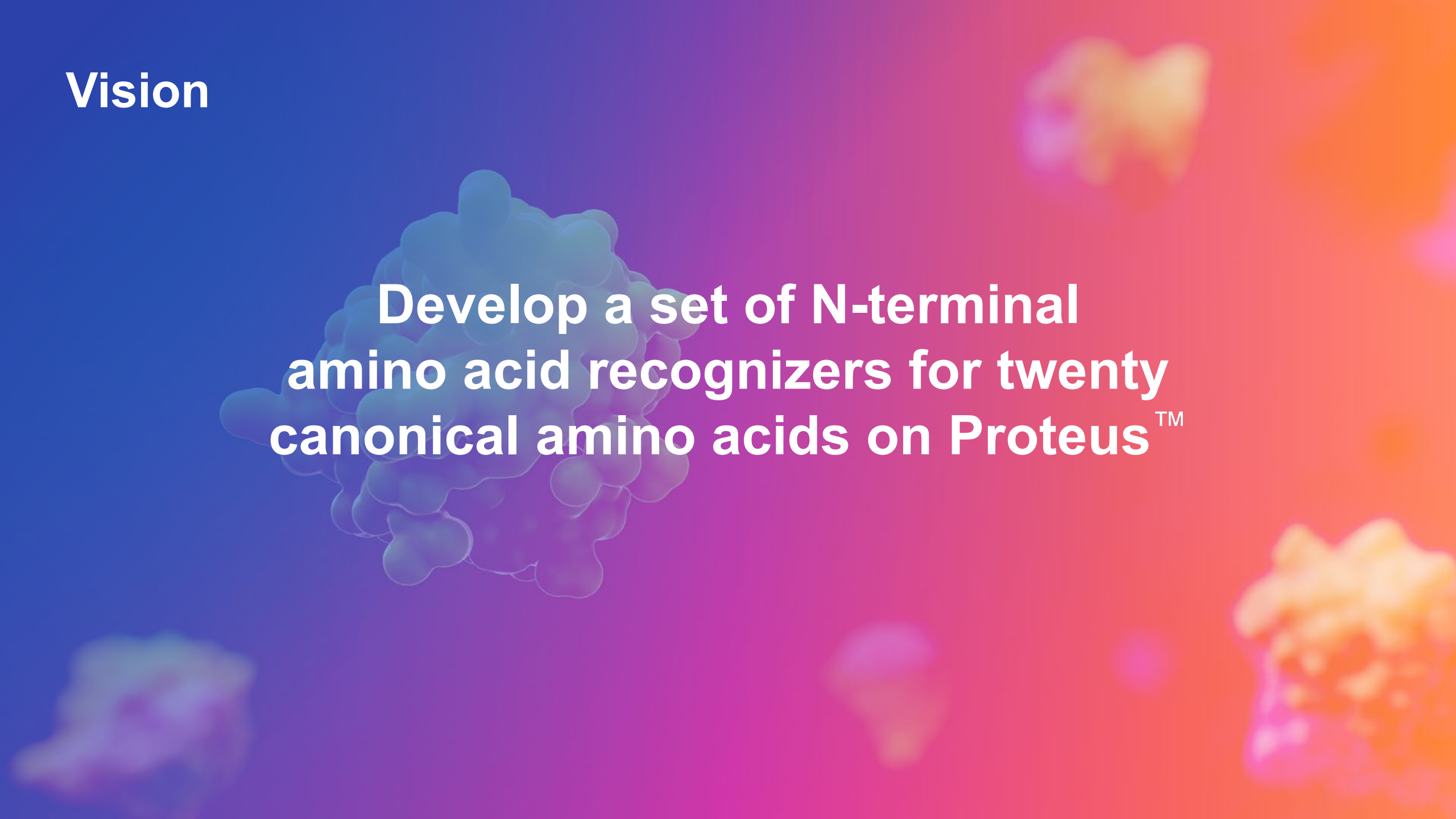
Multiple imaging regions per flow cell

The Path to Detecting all 20 Amino Acids

John Vieceli, Chief Product Officer
November 19, 2025



Vision



Develop a set of N-terminal
amino acid recognizers for twenty
canonical amino acids on Proteus™

Recognizer Roadmap

Sequencing Technology Overview



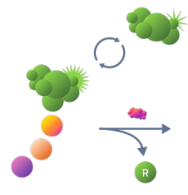
Recognizers bind amino acids in sequence



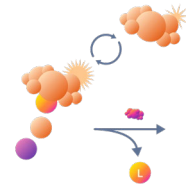
Recognition events produce kinetic signatures



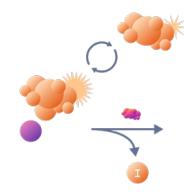
Excitation



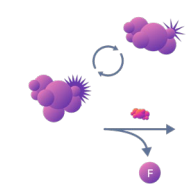
'R' Sequenced



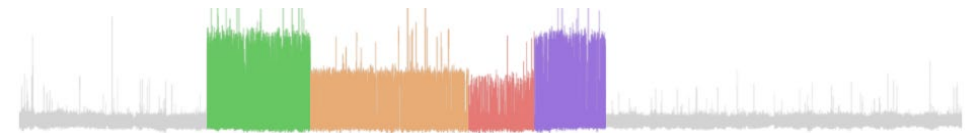
'L' Sequenced



'I' Sequenced



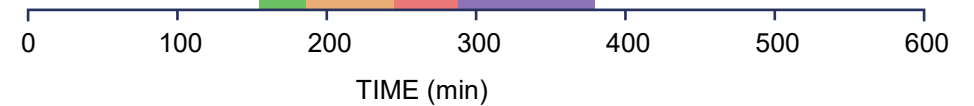
'F' Sequenced



Kinetic signature plot

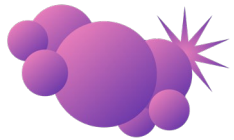
0.24s 3.23s 0.23s 0.97s

R L I F

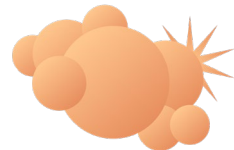


Amino Acid Recognizers in Sequencing Kit V4

Recognition for 14 of 20 amino acids using 6 recognizers



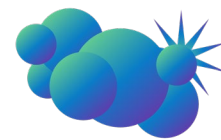
FYW



LIV



R



GAS



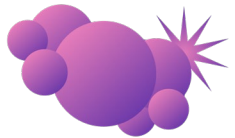
NQ



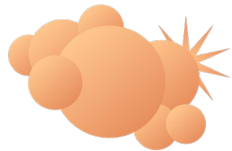
DE

Software Improvements Enable More Amino Acids

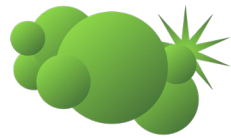
Q4 software release with Library Prep Kit V3 will increase to 15 amino acids



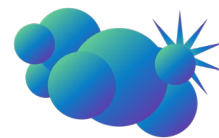
FYW



LIV



R



GAS



NQM



DE

Peptide from
Programmed Death-Ligand 1

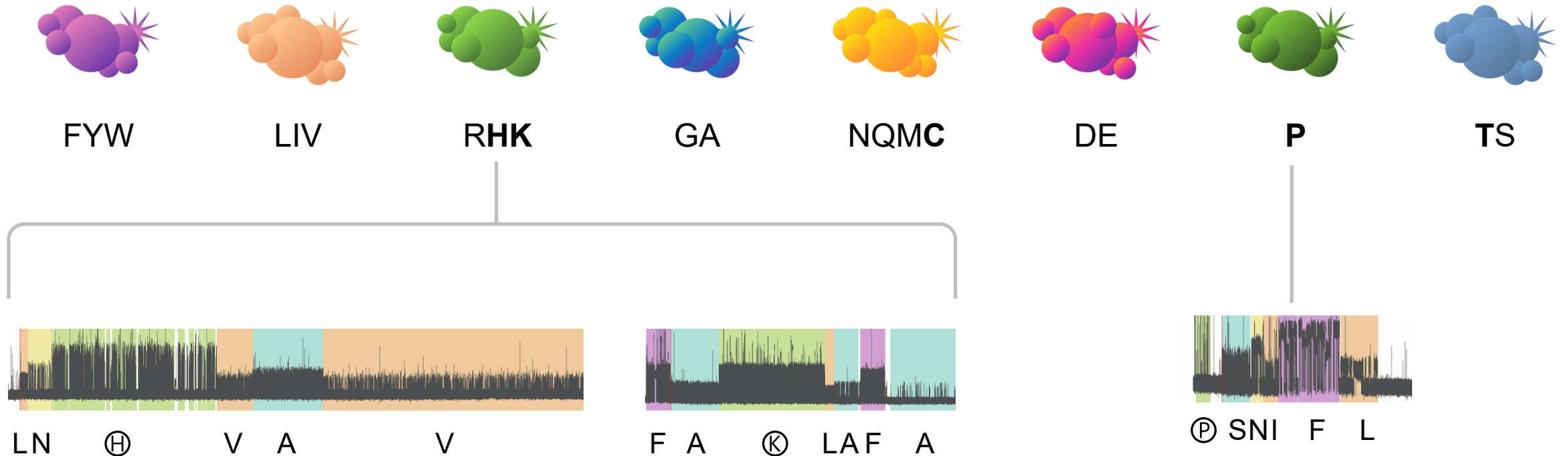


Peptide from
Hepatocyte Growth Factor



Path to 20 Amino Acids with 8 Recognizers

Detection of 18 amino acids demonstrated with campaigns for C and T underway



Recognizer Roadmap Supported on Proteus

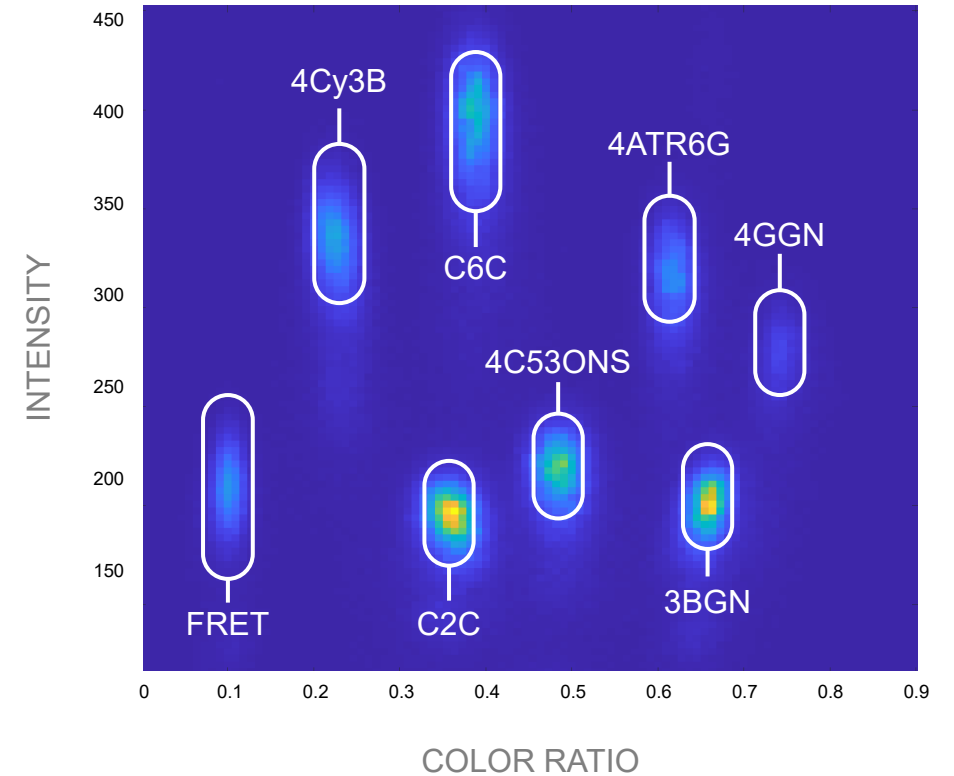
Intensity and color ratio space supports 8+ dyes



Eight dyes have been demonstrated on Proteus prototype system



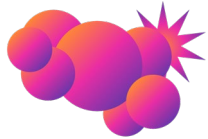
Additional dye space available if necessary



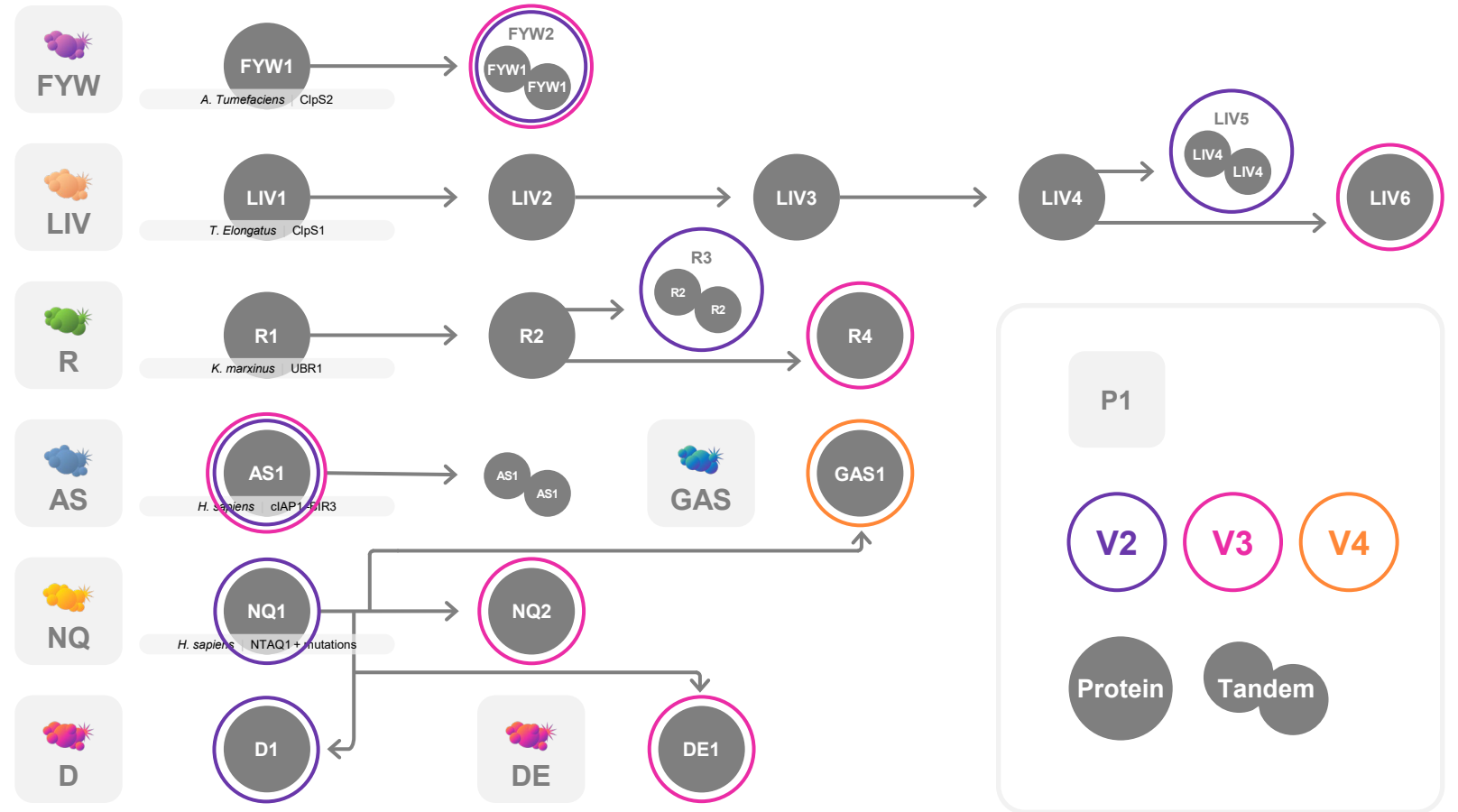
Recognizer Development Pipeline

Recognizer Evolutionary Tree

6 recognizers in Sequencing Kit V4 were derived from 4 starting proteins

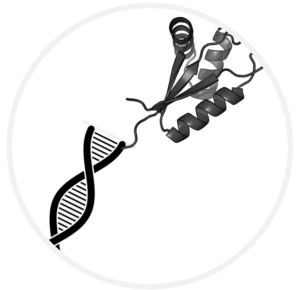


QSI recognizers
protected by 27 granted
patents and applications

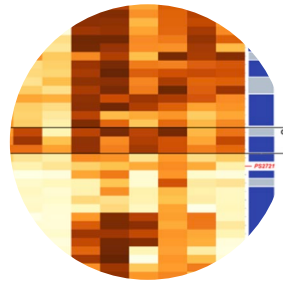


Quantum-Si N-terminal Amino Acid Recognizer Data

Binding Data

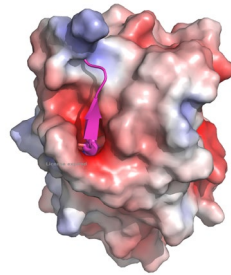


~10⁷

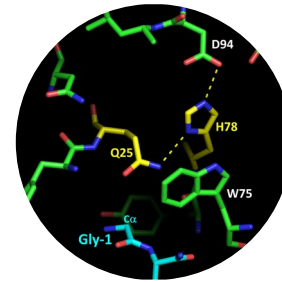


~3,500

Structural Data

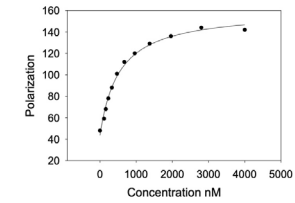


~800

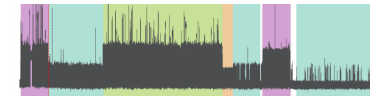


~40

Kinetic Data



~100



~300

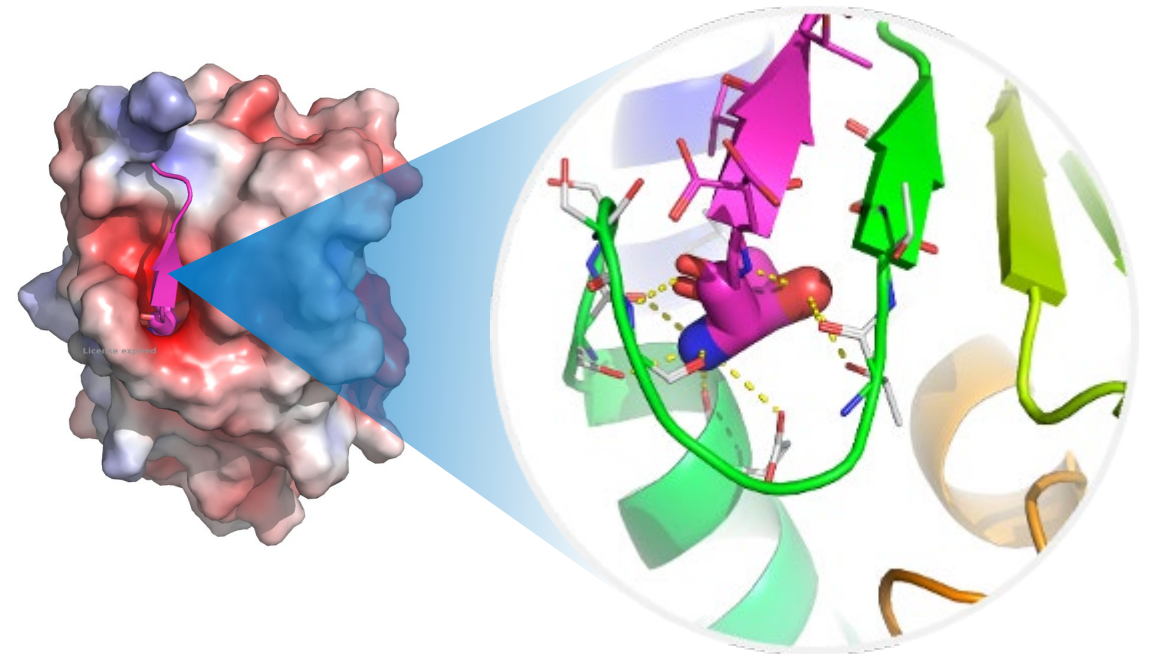
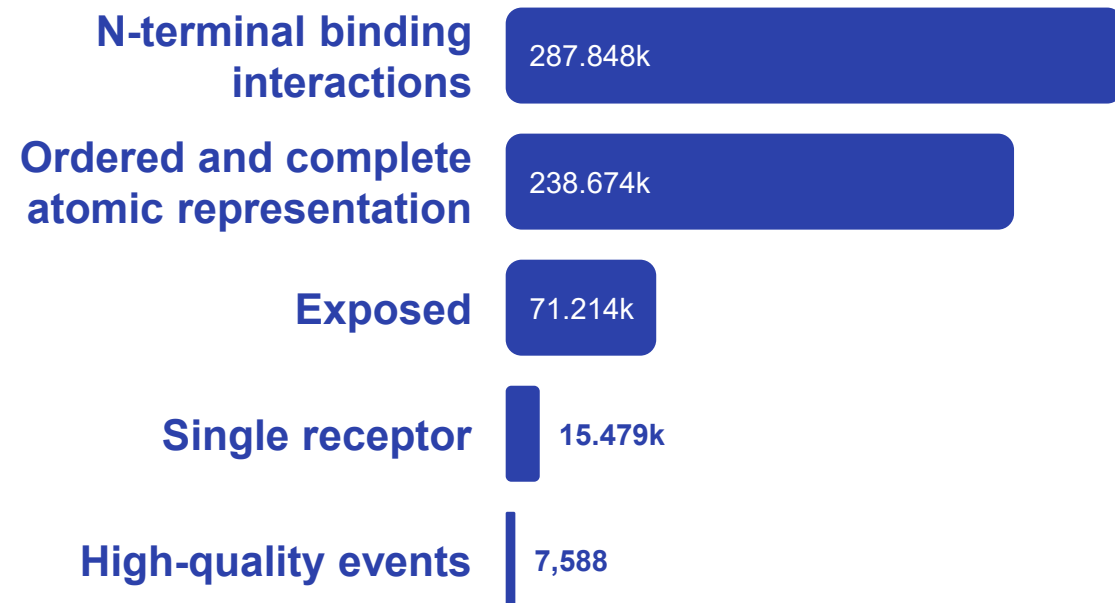
Labeled amino acid sequence data for binding N-terminal amino acids

AI model refinement

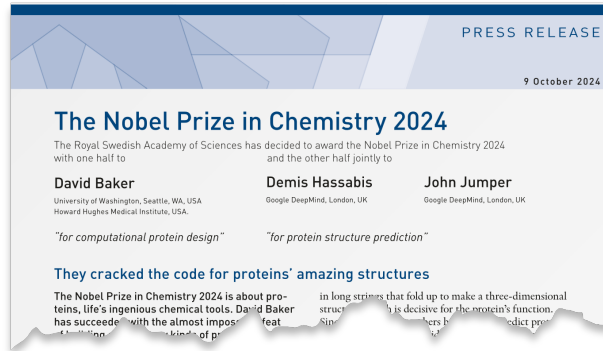
Predicted N-terminal amino acid binder

Protein Databank Mining for N-terminal Binders

Used for scaffold generation and model training



AI Model Refinement Enabled By Academia and Industry



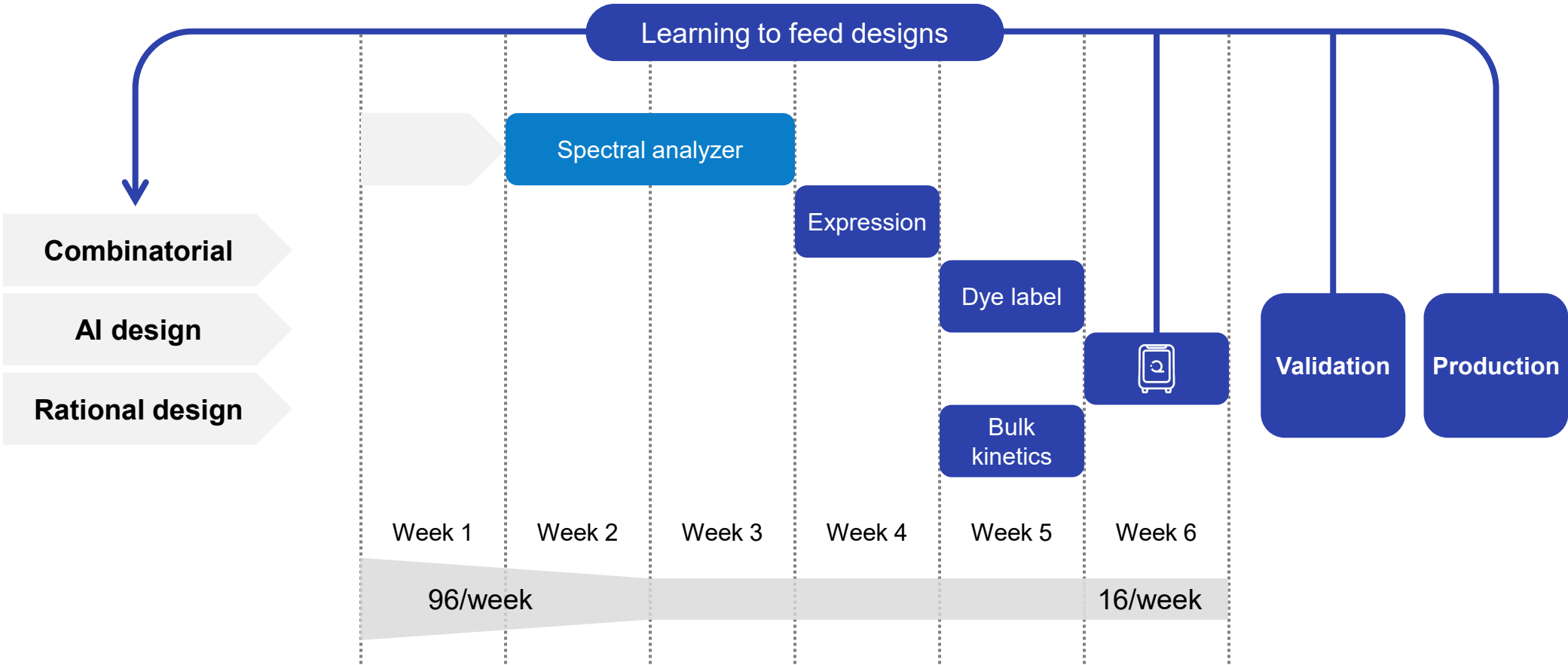
Ligand message-passing neural network

Evolutionary scale modeling

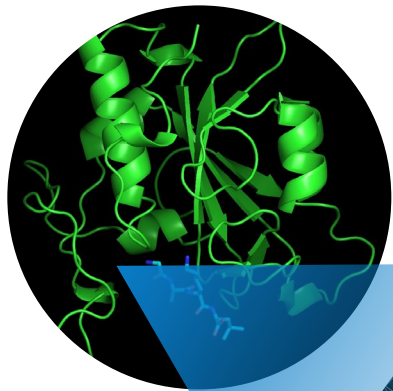
GPU hardware acceleration

4× Scale-up of Recognizer Development Pipeline

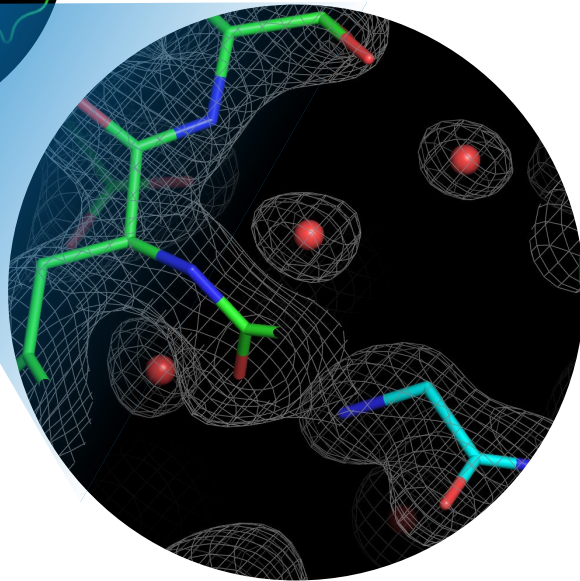
Utilize AI, rational, and combinatorial design approaches to generate candidates for screening pipeline



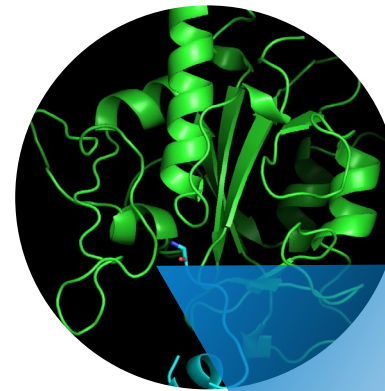
X-ray Crystallography with Combinatorial and AI Strategies Yielded the GAS Recognizer



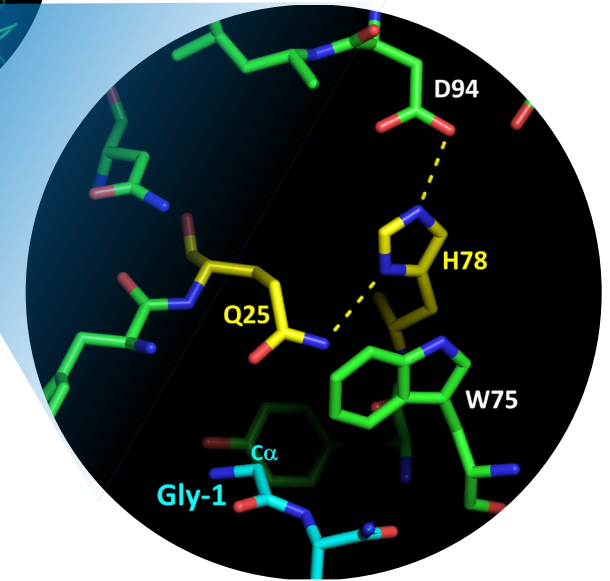
Crystal structure of NQ recognizer with GAKL peptide



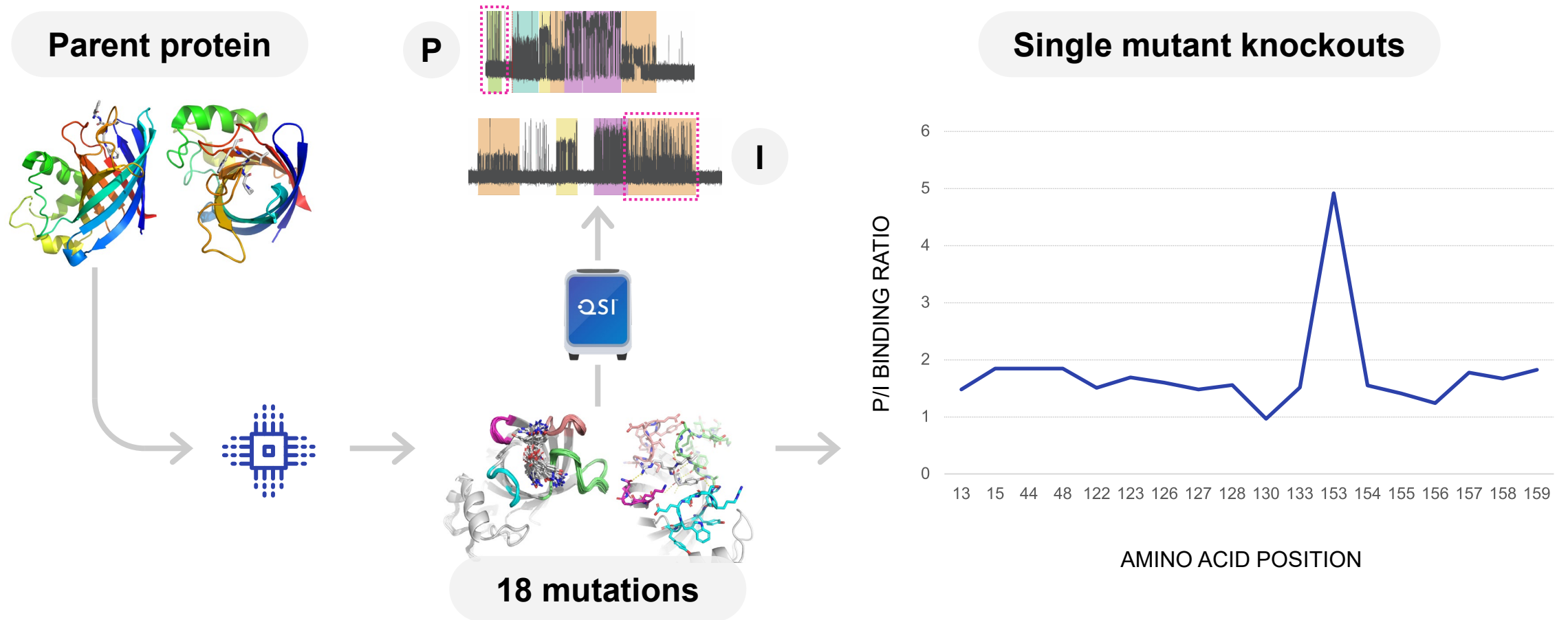
Info from
combinatorial
screening + AI



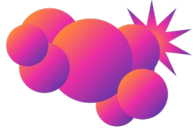
Several modifications in the pocket lead to G, A, and S binding, while not allowing for N and Q



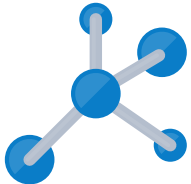
Proline Recognizer from AI and Combinatorial Methods



Summary of the Path to Twenty Amino Acids



Current recognizer pipeline has candidates to go from 14 amino acids with Sequencing Kit V4 to **18 at Proteus launch in 2026**



Recognizer development program is being scaled **4×** to achieve detection of all canonical amino acids in 2026 and **release on Proteus in 2027**



Efforts in artificial intelligence utilize Quantum-Si screening data to refine deep learning and language models, in conjunction with rational and combinatorial design, to **accelerate the pace of recognizer development**

PTM Analysis Solutions

Brian Reed, PhD

Head of Research

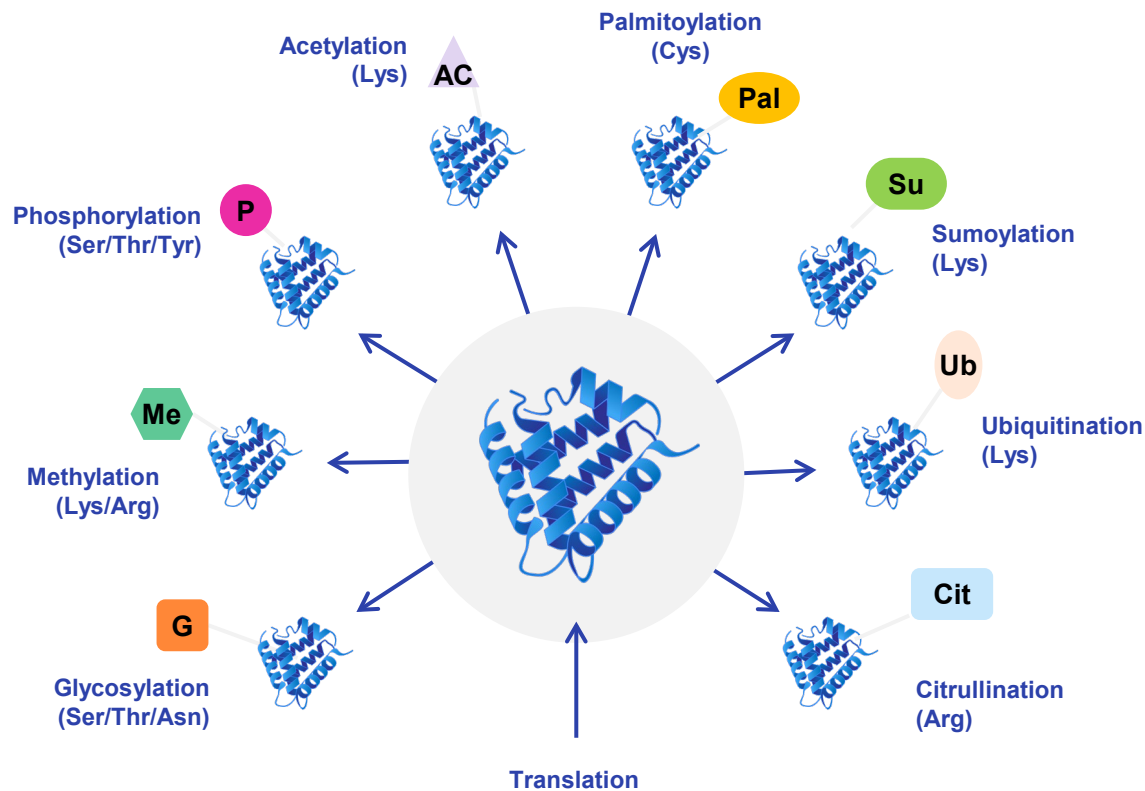


Agenda

PTM Solutions on Proteus

- 1 Advantages of single-molecule detection for PTMs**
- 2 Broad access to PTMs on Proteus**
- 3 PTM applications on the path to Proteus launch**

PTMs and Proteoforms are the Next Frontier in Human Health

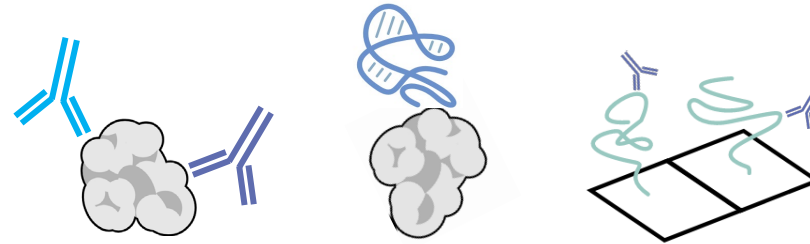
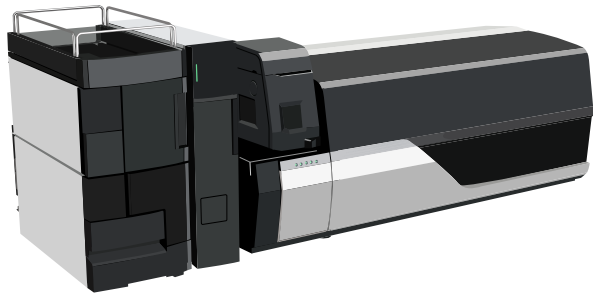


A post-translational modification (PTM) is a chemical change to an amino acid made *after* a protein has been expressed.

There are hundreds of different types of PTMs. A handful are of high interest in the proteomics due to their high abundance and roles in disease pathways. Examples: phosphorylation, glycosylation, ubiquitination.

PTMs determine actual protein function — making them essential for understanding disease mechanisms and therapeutic targets — but have been difficult to study with current proteomics technology.

Challenge to Detecting PTMs With Existing Technologies



Mass spectrometry

- Quantification difficult
- Ambiguity in modification site assignment
- Multi-site combinations extremely challenging
- Workflow and analytical complexity (limits clinical adoption)

Affinity-based platforms

- Detect proteins but provide no proteoform information

OR

- Need costly site-specific affinity reagents for *every* protein

Advantages of Single-molecule Detection for PTMs

- **Quantitation** straightforward due to direct counting of molecules
- **Direct PTM** site identification
- **Access to multi-site** PTM combinations
- **Simple workflows** for broad PTM proteome coverage; clinical compatibility
- **Universal PTM detection** reagents and assays for *all* proteins



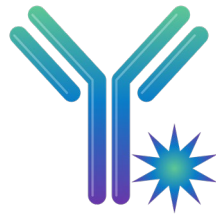
Single-molecule Detection Enables Broad PTM Coverage

NGPS unlocks broad and universal access to PTMs with three complimentary approaches | Can be used in combination to address the most challenging needs in PTM detection



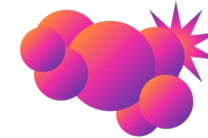
Kinetics

PTM detected via kinetic changes at upstream AAs



Pre-recognition

PTM detected with a PTM binder prior to sequencing



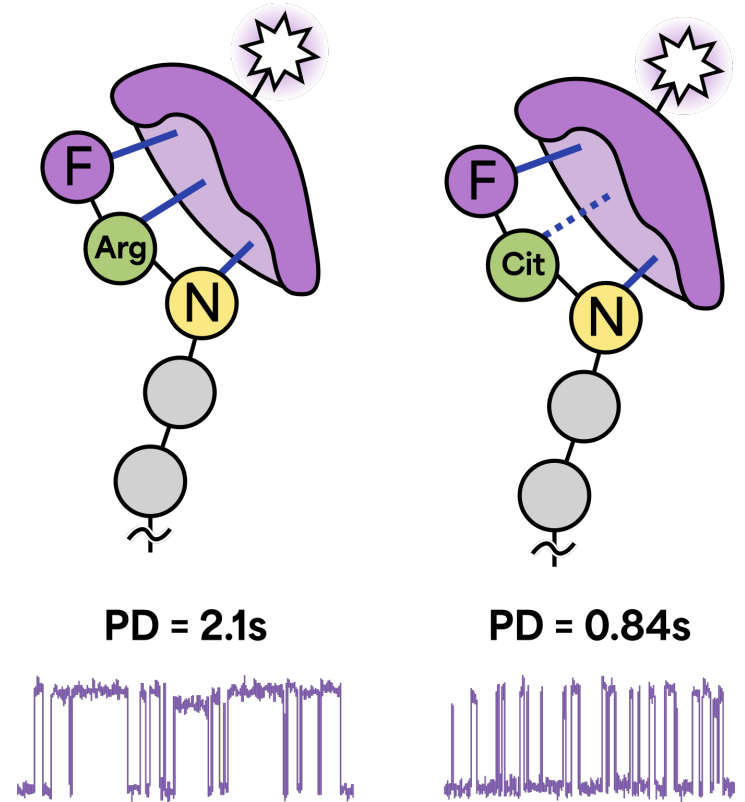
Direct NAA detection

PTM detected with an N-terminal PTM binder during sequencing

Complete AA coverage and deep peptide sequencing will enable very high proteome-wide PTM coverage on Proteus for all three methods

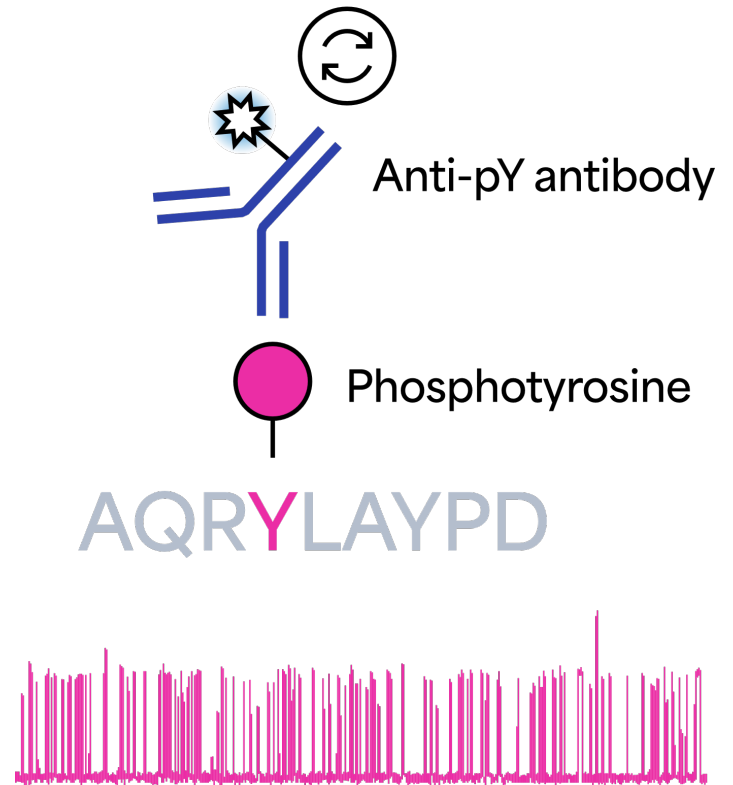
Kinetic Detection of PTMs

- **Kinetic response to PTMs** is a universal feature of NAA recognizers—when the chemical makeup of the peptide changes, the kinetics change. No extra reagents or processing steps needed
- **Examples:** phospho-, methyl-, acetyl-, oxidation, citrullination
- **Customers are using** to dissect complex PTM arrangements that are ambiguous or inaccessible with MS



Pre-recognition of PTMs

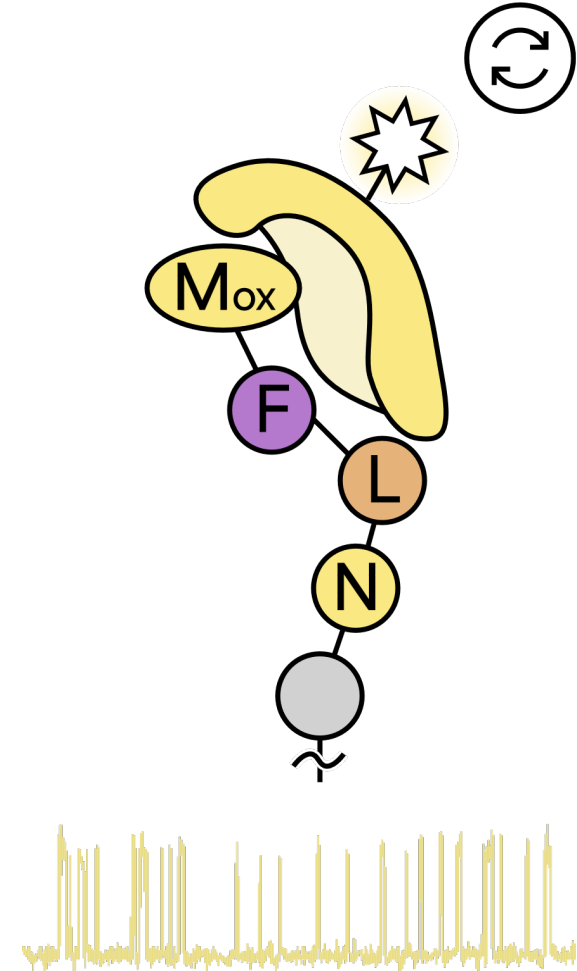
- **PTM detection at any position** regardless of peptide length
- **Parallel detection** of multiple PTMs
- **E.g., Pan-phospho kit:** Comprehensive detection of pS/pT/pY in one assay
- **Extreme sensitivity** to PTM stoichiometry due to the clear pulsing pattern from PTM recognition



Direct N-terminal Detection of PTMs

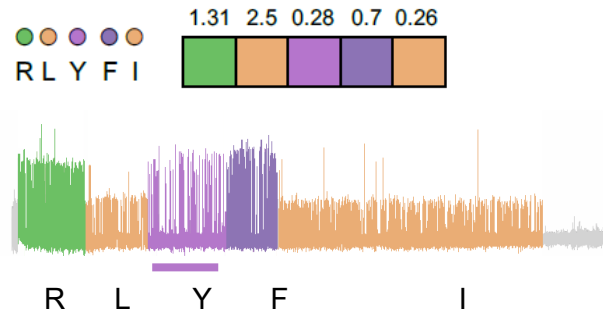
Direct NAA detection

- **N-terminal PTM recognizer** included in sequencing assay
- **Can be standard** NAA recognizer or custom
- **Enables reference-free/*de novo*** PTM discovery
- **Suitable for very complex** sequence contexts and multisite PTM/variant arrangements

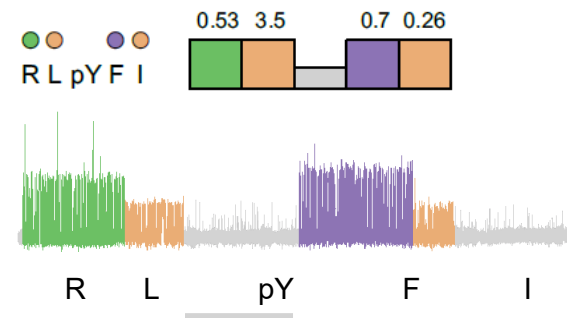


Kinetics: Influence of Downstream pY on NAA Recognizers

Unmodified peptide

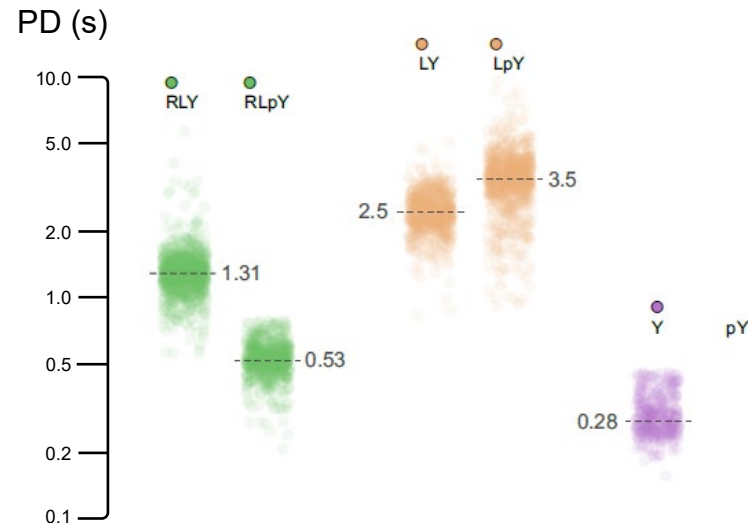


pY modified peptide



How pY influences recognizer kinetics in this peptide

- **R pulse duration** decreases from 1.3 to 0.5 sec.
- **L pulse duration** increases from 2.5 to 3.5 sec.
- **Y** is no longer recognized



Used to detect tropomyosin proteoforms

Journal of
proteome
research

pubs.acs.org/jpr Article

Protein Sequencing with Single Amino Acid Resolution Discerns Peptides That Discriminate Tropomyosin Proteoforms

Natchanon Sittipongpittaya,[‡] Kenneth A. Skinner,^{#,‡} Erin D. Jeffery, Emily F. Watts, and Gloria M. Sheynkman*

Cite This: <https://doi.org/10.1021/acs.jproteome.4c00978> Read Online

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ABSTRACT: Protein variants of the same gene—proteoforms—can have high molecular similarity yet exhibit different biological functions. Thus, the identification of unique peptides that unambiguously map to proteoforms can provide crucial biological insights. In humans, four human tropomyosin (TPM) genes produce similar proteoforms that can be challenging to distinguish with standard proteomics tools. For example, TPM1 and TPM2 share 85% sequence identity with amino acid substitutions that play unique roles in muscle contraction and myopathies. In this study, we evaluated the utility of the single amino acid resolution (SAR) method for identifying and discriminating these proteoforms.

Sequence single peptides Resolve single amino acids

Proteomic-level variation

TPM-based variation

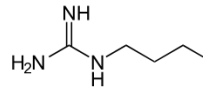
PTM-based variation

<https://pubs.acs.org/doi/pdf/10.1021/acs.jproteome.4c00978>

Kinetics: Influence of Citrulline on NAA Recognizers

Arginine citrullination is challenging to detect by mass spec because of the negligible increase in mass (0.984 Da)

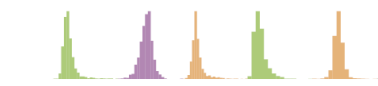
Unmodified peptide



Arginine (R)

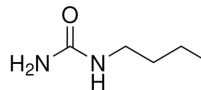


99.9% 97.9% 97.5% 97.9% 94.2%



PD: 0.47 3.49 0.48 0.35 1.99

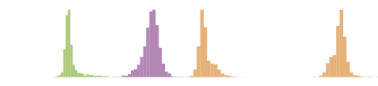
Cit-modified peptide



Citrulline (Cit)

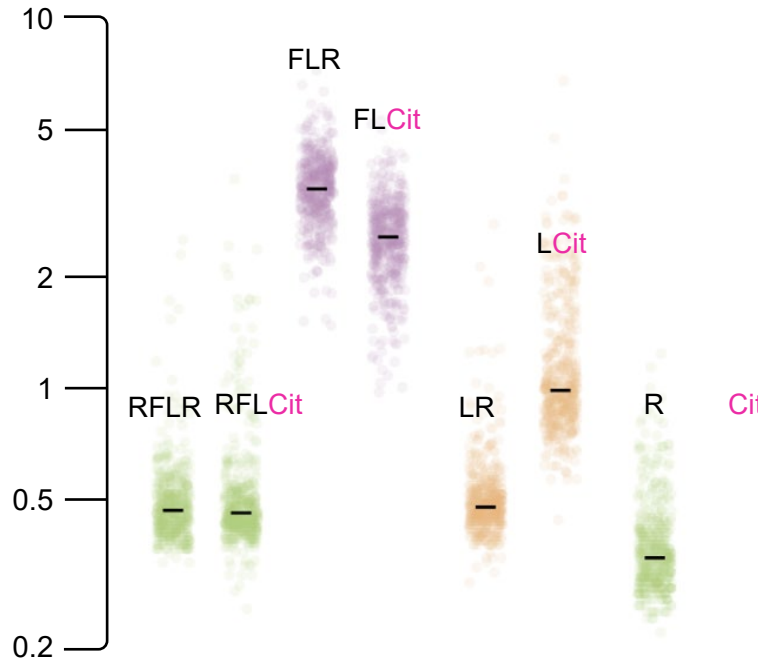


99.9% 98.9% 94.7% 81.2%



PD: 0.46 2.65 1 1.88

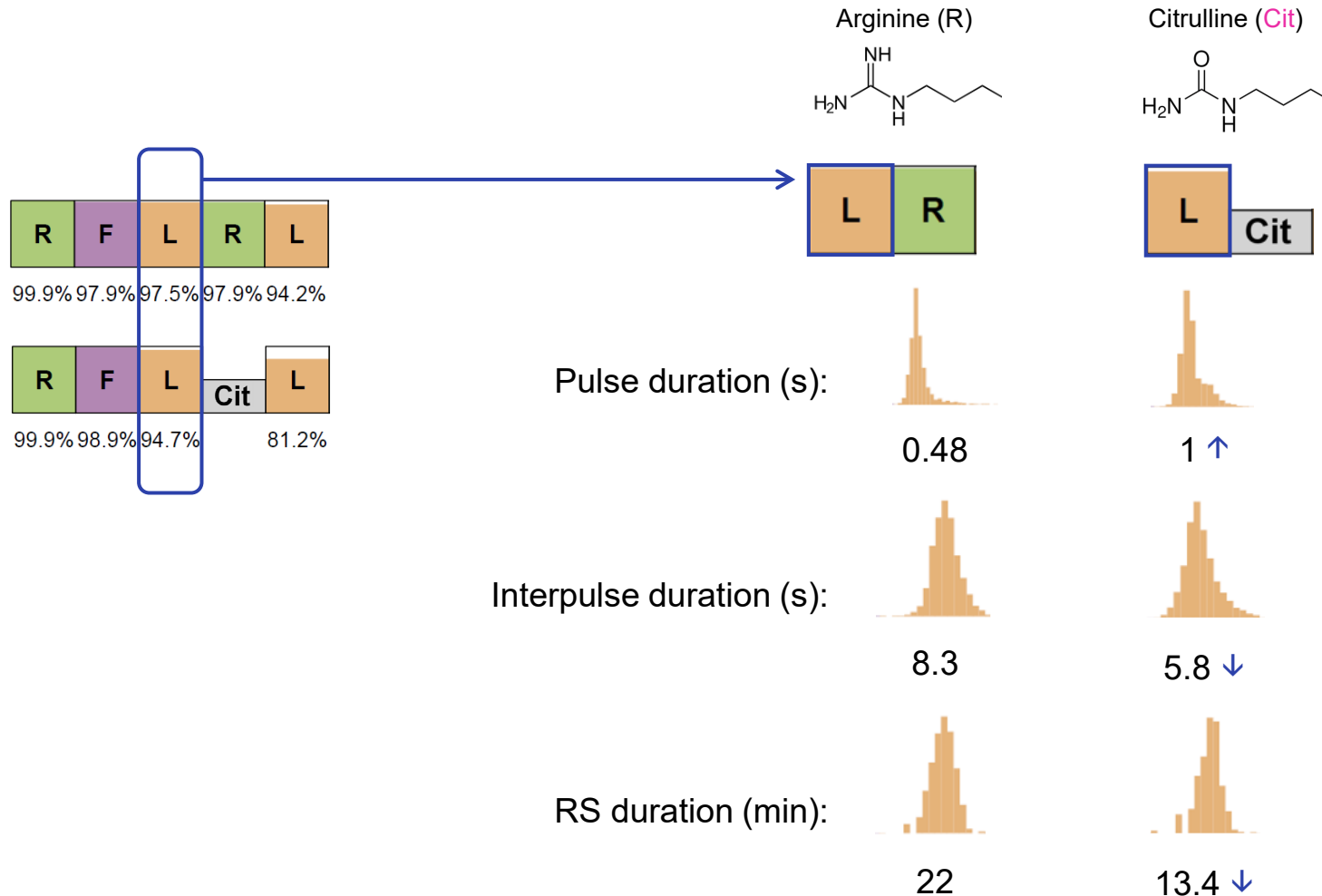
PD (s)



How citrulline influences recognizer kinetics in this peptide

- **F pulse duration** decreases from 3.49 to 2.65 seconds
- **L pulse duration** increases from 0.48 to 1.0 seconds
- **R** is no longer recognized

Kinetics: Multiple Kinetic Parameters Inform PTM Detection

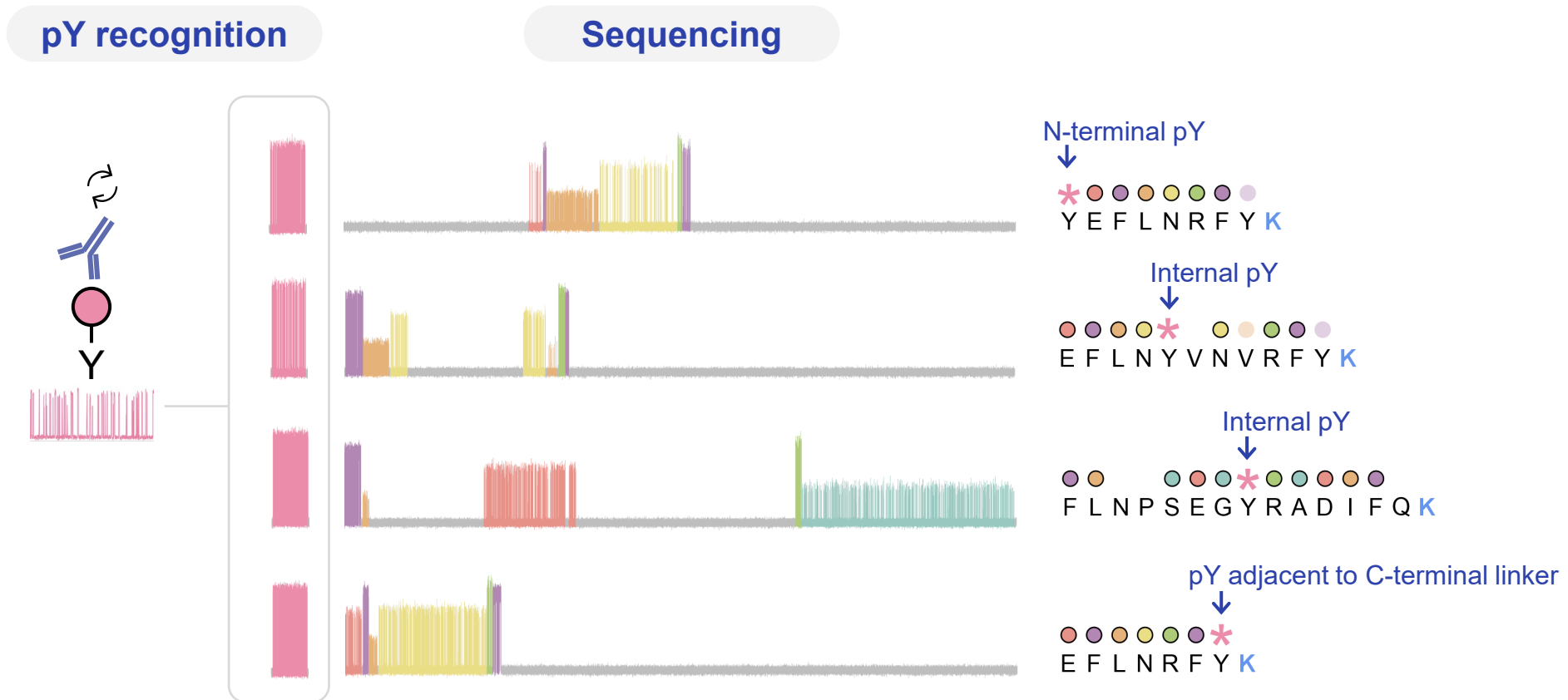


Citrulline and other PTMs influence *multiple* kinetic parameters

- **Pulse duration:** the lifetime of the recognizer-NAA bound state
- **Interpulse duration:** the time between recognizer binding events
- **Recognition segment (RS) duration:** the time between NAA cleavage events

Pre-recognition: pY Detection at *Any* Peptide Location

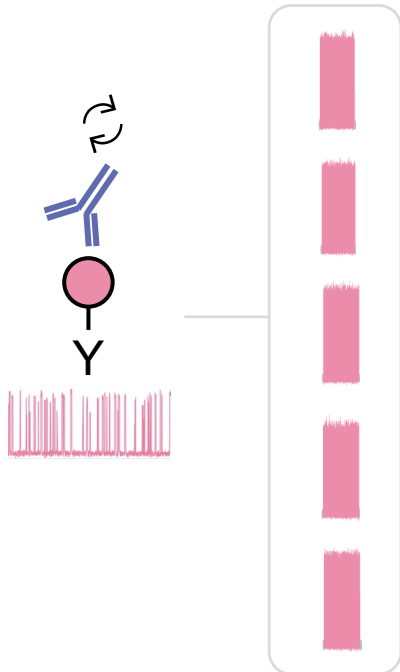
An anti-phosphotyrosine antibody detects phosphotyrosine at any peptide location — N-terminal, internal, and C-terminal linker adjacent — independent of sequence context



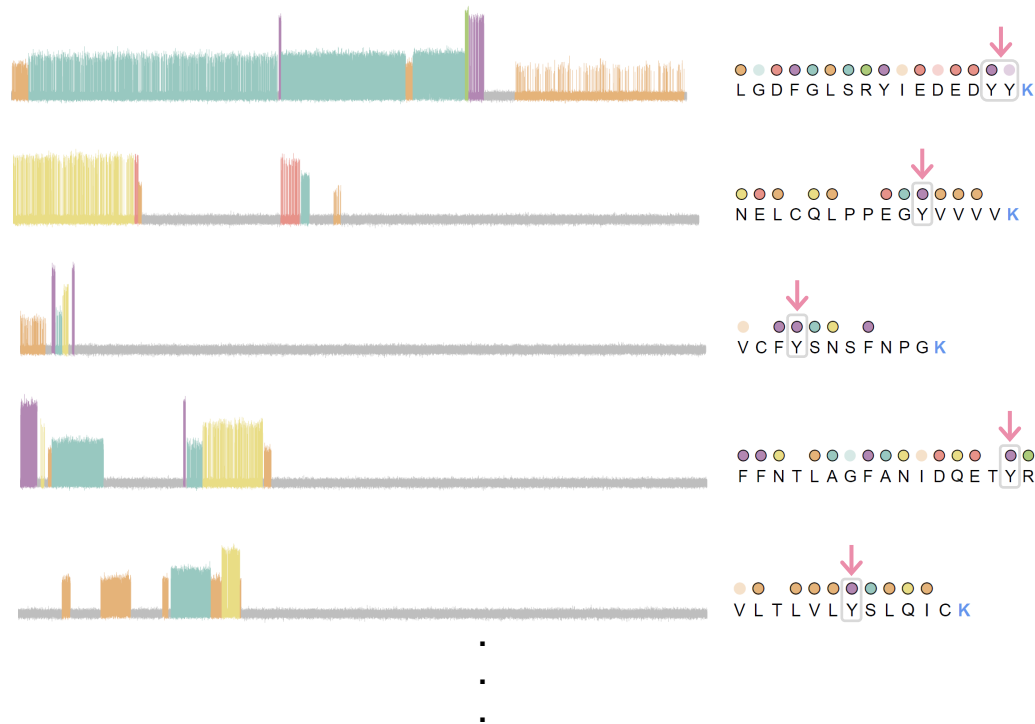
Pre-recognition: Carna Biosciences Kinase Panel

Phosphorylation is a key determinant of activity for protein kinases used in drug discovery applications | Pre-recognition identifies phosphotyrosine in protein-tyrosine kinase 2-beta (PYK2B) and other important kinases

pY recognition



Sequencing



Analysis

Alignments with pY recognition

50%

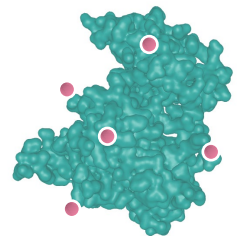
12%

13%

16%

11%

PYK2B

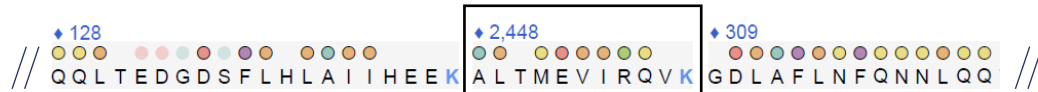


PTM position ID and relative abundance quantitation

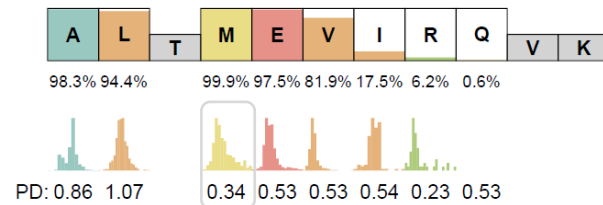
Direct NAA Detection: Methionine Oxidation

The NQM recognizer directly detects N-terminal methionine sulfoxide at position Met91 in IKBA

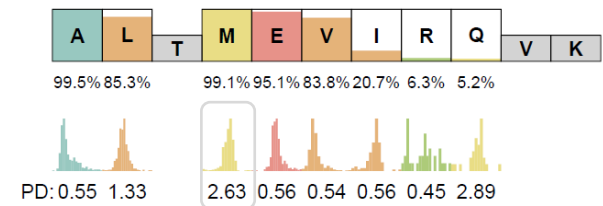
NF-kappa-B inhibitor alpha (IKBA)



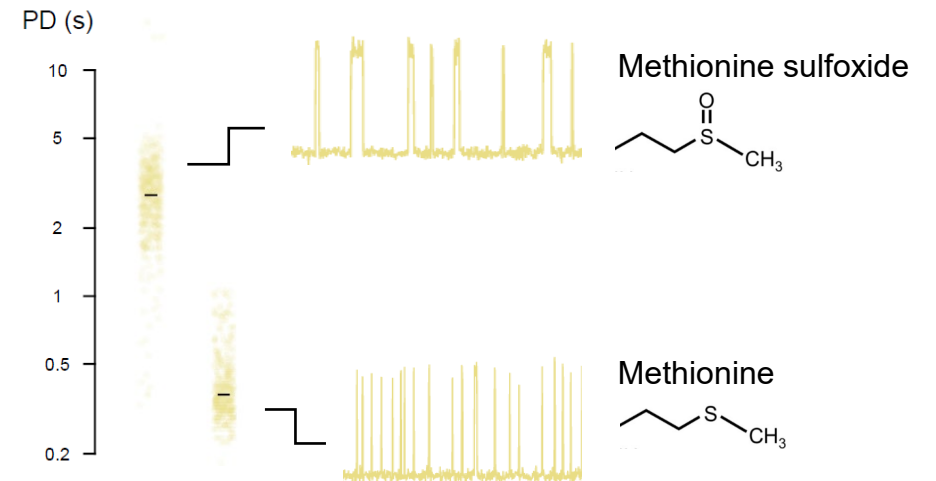
Unmodified methionine: PD = 0.34 s



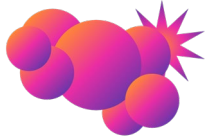
Methionine sulfoxide: PD = 2.63 s



Pulse duration distinguishes the modified and unmodified forms of methionine

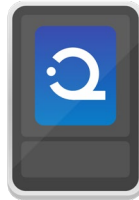


We Have a Clear Path to Broad PTM Coverage on Proteus



Recognizer development

Recognizers for all 20 amino acids will ensure maximum protein coverage and kinetic information available for PTM detection with all three methods



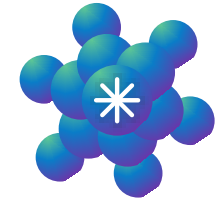
Higher output on Proteus

Enables deeper and more sensitive PTM detection and multiplexed panel-based solutions



Artificial intelligence

For data analysis to fully extract the massive volume of kinetic information in our NGPS output for PTM and variant detection and quantitation



PTM access with three methods

Three complimentary approaches that can be used in combination ensure access to the broadest range of PTMs anywhere in the proteome

The Road to Proteus Launch



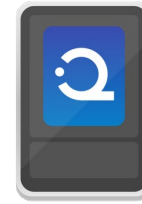
From Platinum to Proteus — Market Learnings Inform Proteus Requirements and Commercial Strategy



General technology first;
defined applications second

Sample prep-agnostic

Broad marketing to all segments
at launch



Defined applications first;
general technology second

Sample-to-report workflows for
high-value applications

Focused launch — achieve
application depth in target segment(s)

Amino acid coverage ▲

Reliability ▲

Sample input ▼

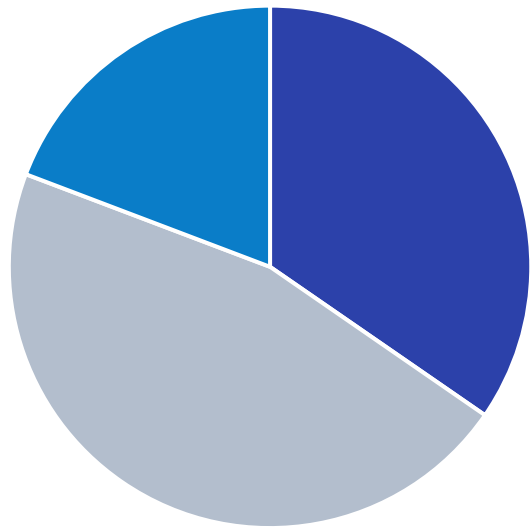
Sequencing output ▲

Consumable COGs ▼

The Customer Data is Clear

Researchers need a breadth of capabilities to answer their biological questions

Number of PTMs Required



■ One ■ Two ■ Three or more

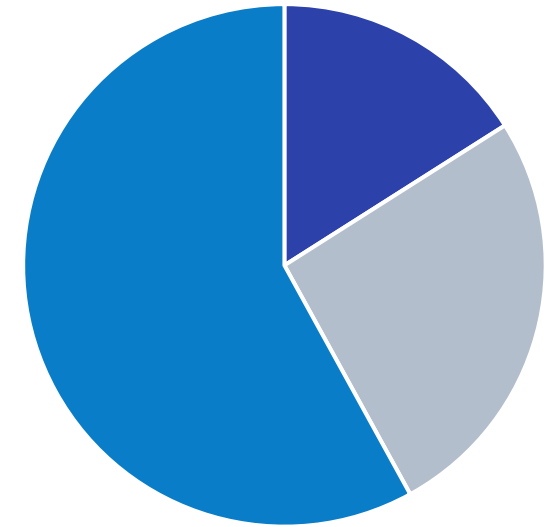


More than 50 detailed study proposals submitted by prospective customers

>50% require three or more types of protein analysis applications

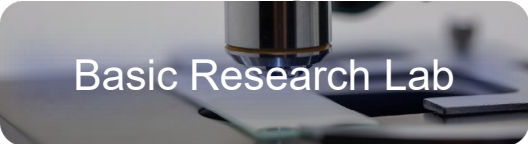
Detection of two or more PTMs is required in **>65%** of cases

Number of Unique Applications



■ One ■ Two ■ Three or more

A Look Inside an Academic Medical Center



Basic Research Lab

- Wide range of application interests
- Limited infrastructure
- Lower utilization



Core Lab

- Many technologies in use in one lab
- Significant infrastructure
- High utilization potential



Translational Lab

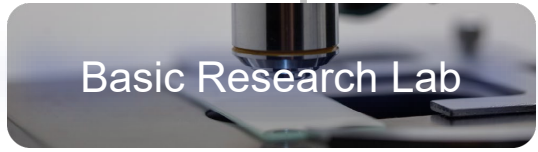
- Targeted applications; many involve PTMs
- Value automation
- High utilization potential



Clinical Lab

- Defined application content; *sample-to-report* workflows
- Automation is key
- High utilization potential given repeat sample testing

Platinum Case Study — The Academic Medical Center



Good value prop but most users are low-utilization



Limited to reflex testing downstream of mass spec



Adoption limited by current technology capabilities



Not accessible with Platinum Pro

The Increased Sequencing Output and Lower Costs of the Nanowell Array is Broadly Enabling



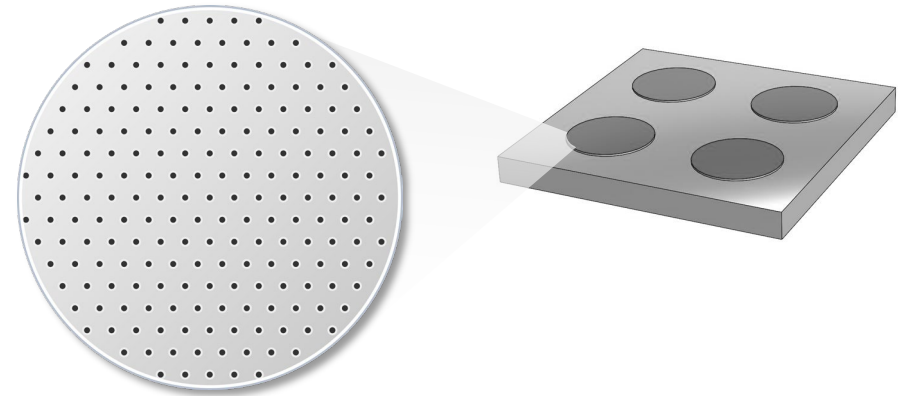
More samples per run with 40× the output per consumable compared to Platinum Pro



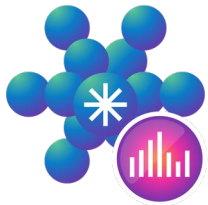
Deep analysis of a single sample to address complex mixtures or rare events like variants or PTMs



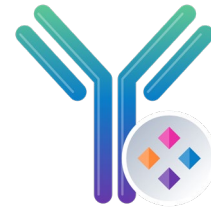
Multiplexing samples to achieve higher throughput and lower costs per sample for cost sensitive applications like protein ID



Accelerating the Core Sequencing Technology and Analytics to Unlock the Highest-value Applications



Robust PTM detection
and multi-PTM profiling



Sequencing of variable
regions of antibodies



Single-amino acid
variant detection



Biothreat detection
and surveillance

Proteus Automation Greatly Simplifies the Sequencing Workflow and Makes New Lab Startup Even Easier



Over 30 individual reagent tubes to handle to process four samples

Over 100 pipetting steps per sample



A single reagent module per run — simply unbox and load

Pipette your sample(s) into the cartridge and hit *Run*

Building a Partner Ecosystem to Accelerate Application Development + Deliver *Sample-to-report* Workflows



New Industry Partnerships in PTMs and Ultra-low-abundance Protein Panels

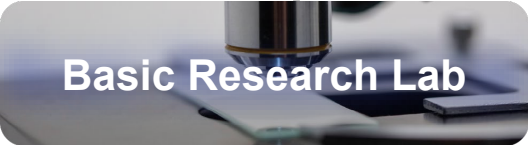


- Carna Biosciences is a leading provider of assay-grade kinase proteins to biopharma for drug discovery and profiling
- Carna Biosciences is evaluating the use of QSI technology to assess and validate phosphorylation profiles of kinases
- Collaboration presents the potential to leverage the complementary strengths and global reach of both organizations

SIENA • QUANT™

- Siena Quant™ is a SISCAPA Holdings Company — experts in the field of sample enrichment for proteomics
- Siena Quant is enabling the quantitation of ultra-low-abundance biomarkers that have been historically unreliable to measure
- QSI and Siena Quant will collaborate to develop sample-to-report workflows for customers to accurately measure clinically relevant biomarker panels

Proteus Will Increase the Depth of Penetration in Academic Medical Centers Compared to Platinum



Single-molecule protein sequencing will remain a useful tool for basic research



High-value application capabilities + increased throughput = first-line platform



Expanded PTM capabilities + high-value targeted panels + automation

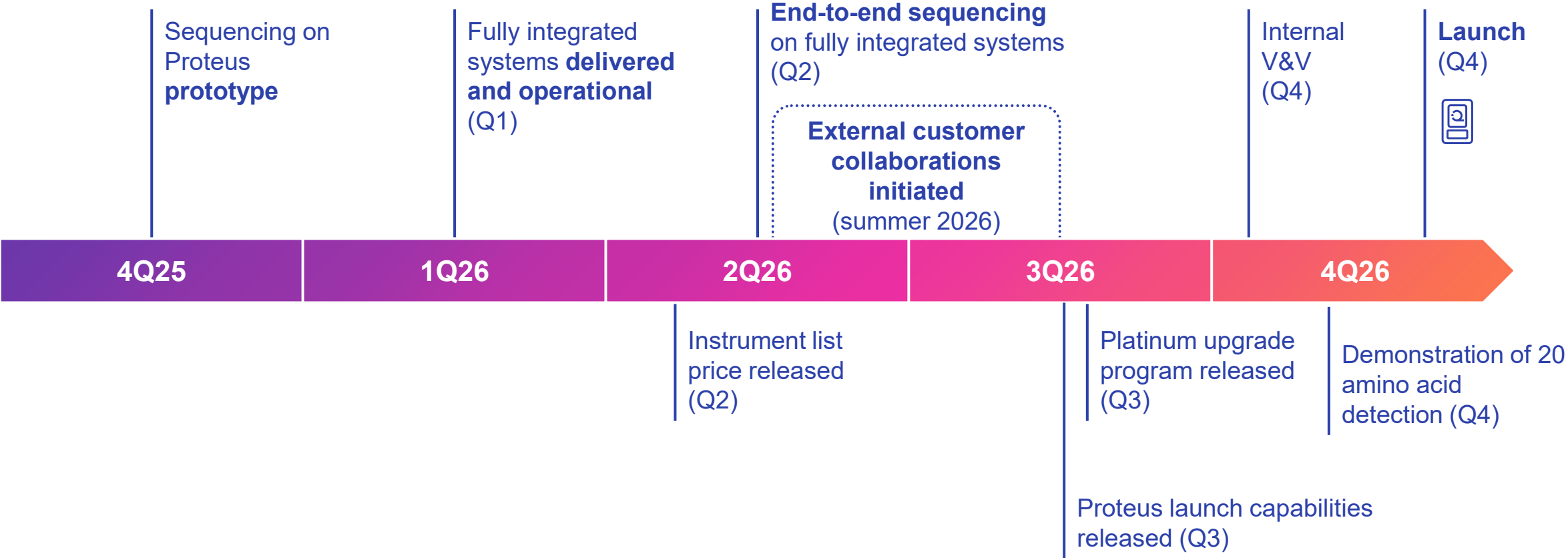


Automation + sample-to-report workflows opens this lab for Proteus

Proteus Will Enable Single-molecule Protein Sequencing Across a Broad Range of End Markets



Milestones on the Path to Proteus Launch in 2026



QSI is Well-positioned to Build Upon Our First-to-market Advantage and Extend Our Leadership into the Future



Grow user base with
Platinum Pro and
develop the market for
Proteus launch



Execute on
development roadmap
to deliver a compelling
Proteus launch



Build a partner
ecosystem to
accelerate application
development + deliver
sample-to-report
workflows



Extend our technology
lead through best-in-
class R&D innovation
+ execution