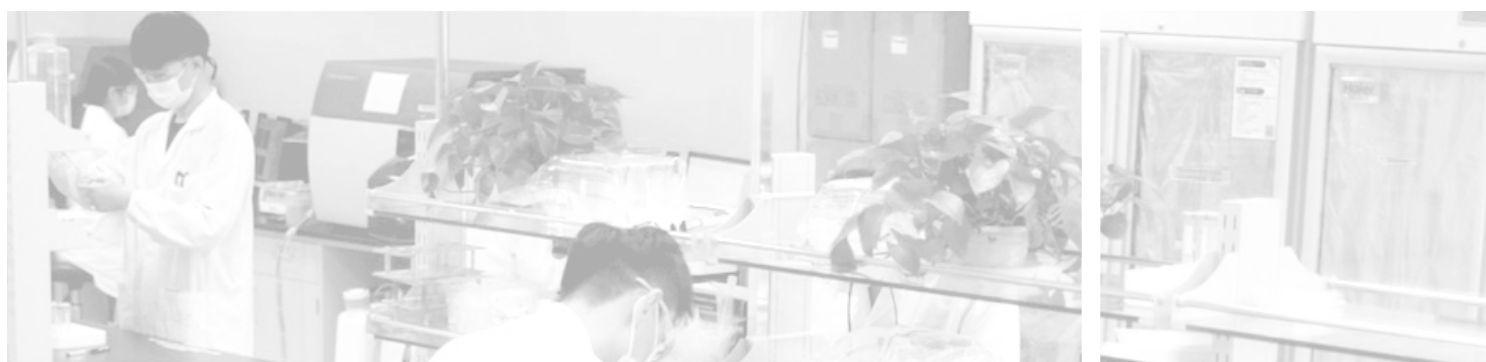


CHEMPARTNER

DEDICATED TO LIFESCIENCE

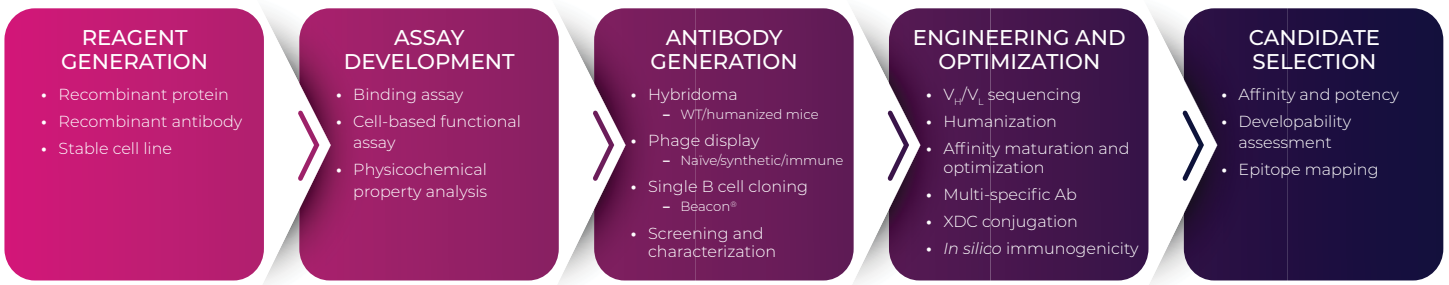


BIOLOGICS DISCOVERY
SOLUTIONS



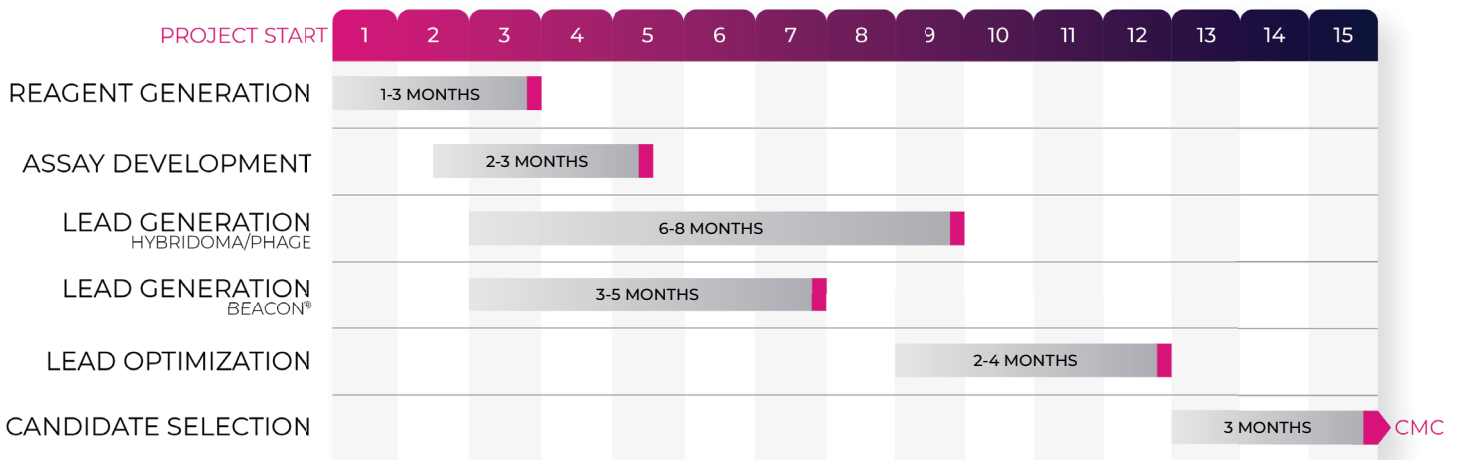
BIOLOGICS DISCOVERY PLATFORM

COMPREHENSIVE AND CUSTOMIZABLE



ANTIBODY DISCOVERY PROCESS

ONE-STOP SEAMLESS INTEGRATION TO FIT YOUR PIPELINE



ACCOMPLISHED TRACK RECORD

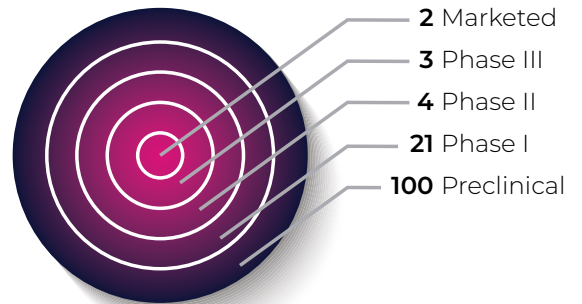
EXTENSIVE EXPERIENCE IN THERAPEUTIC ANTIBODY DISCOVERY

170+ INTEGRATED PROGRAMS

- 35+ Oncology
- 70+ Immuno-oncology
- 10+ Metabolism
- 20+ Immunology

MAJOR DISEASE FIELDS

- Oncology
- Immuno-oncology
- Immunology
- Neuroscience
- Metabolic
- Inflammation
- Cardiovascular
- Aging and Degenerative

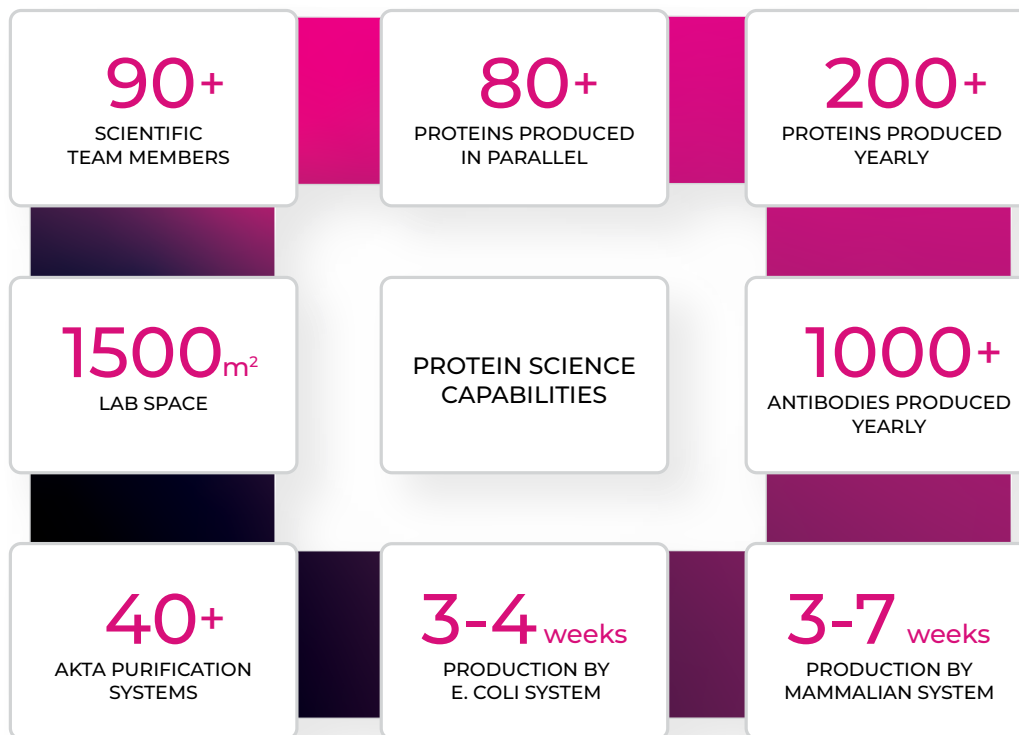


DISCLAIMER

The information contained is based on internal record and public information for general information purposes only. We make no representations or warranties of any kind, express or implied, about the completeness, accuracy, reliability, suitability, or availability with respect to the information for any purpose.

PROTEIN SCIENCE

EXPERTS IN PROTEIN PRODUCTION AND CHARACTERIZATION



PLATFORMS AND SERVICES

PROTEIN EXPRESSION PLATFORMS (100-200L/per system/per week)

- Mammalian
 - Expi293F, Expi193F GnTI-/-
 - ExpiCHO-S, CHOK1
 - ExpiCHO Fut8-/-
 - Transient/stable/virus infection
- Insect
 - SF9, SF21, High Five
 - Bac-to-Bac system
- E. coli
 - BL21 (DE3), BL21 (DE3) pLysS
 - BL21-AI, BL21-codon plus
 - Origami (DE3)
 - Arctic express (DE3) RP
- Yeast
 - Pichia Strain (X33, GS115, KM71H, SMD1168)

CUSTOMIZED RECOMBINANT PROTEIN/Ab PRODUCTION

- Construct design and generation
- Transient/stable expression
- HTP antibody production
- Multispecific antibody generation
- Protein labeling
- Comprehensive protein characterization

INTEGRATED SERVICES TO SUPPORT:

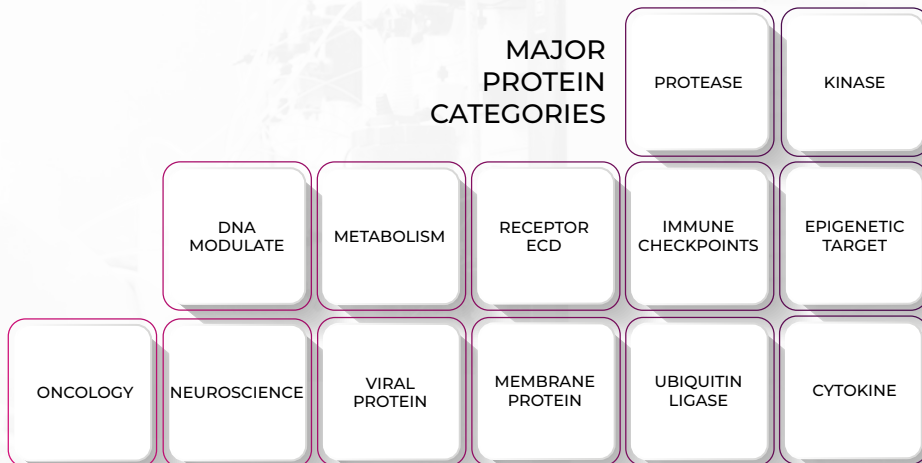
LARGE MOLECULE DRUG DISCOVERY

- Immunization/Screening
- Early/Late optimization
- Assay development
- Structural biology study
- ADC
- Pre-clinical evaluation

SMALL MOLECULE DRUG DISCOVERY

- Compound screening
- Assay development
- Co-crystallography
- Fragment-based screening

MAJOR PROTEIN CATEGORIES



CELL LINE DEVELOPMENT AND APPLICATION FOR IMMUNIZATION AND ASSAY

CAPABILITIES

- 10+ scientists
- 30+ cell lines in parallel
- Complete QC methods
- Single or multiple proteins
- Knockout or knockdown
- Multiple vectors, transfection/ infection methods
- Copy number determination

EXPERIENCE

- Supported 170+ IS projects
- 250+ stable cell lines
- 200+ target proteins
- 50+ host cell lines of human, mouse, and rat
- Single or multiple target proteins
- Multiple subunit complex
- Multiple reporter cell line

APPLICATION

- Immunogen for immunization
- Antigen binding FACS
- Acumen/Mirrorball screening
- Ligand binding and stimulation
- Cell signaling and other functional assays
- ADC cell cytotoxicity assay

COMMONLY USED HOST CELL LINES

EASY

MOI=1-20

Original Virus

HEK293
NIH3T3

EASY TO MEDIUM

MOI=20-50

Concentrated Virus

CHO-K1
1321N1

MEDIUM TO HARD

MOI=50-100

Concentrated Virus

Jurkat
NS0

HARD

MOI>100

Concentrated Virus

Ba/F3
Raji

For new host cell line, the optimal MOI value will be explored to ensure the success of stable cell line generation.

ANTIBODY DISCOVERY

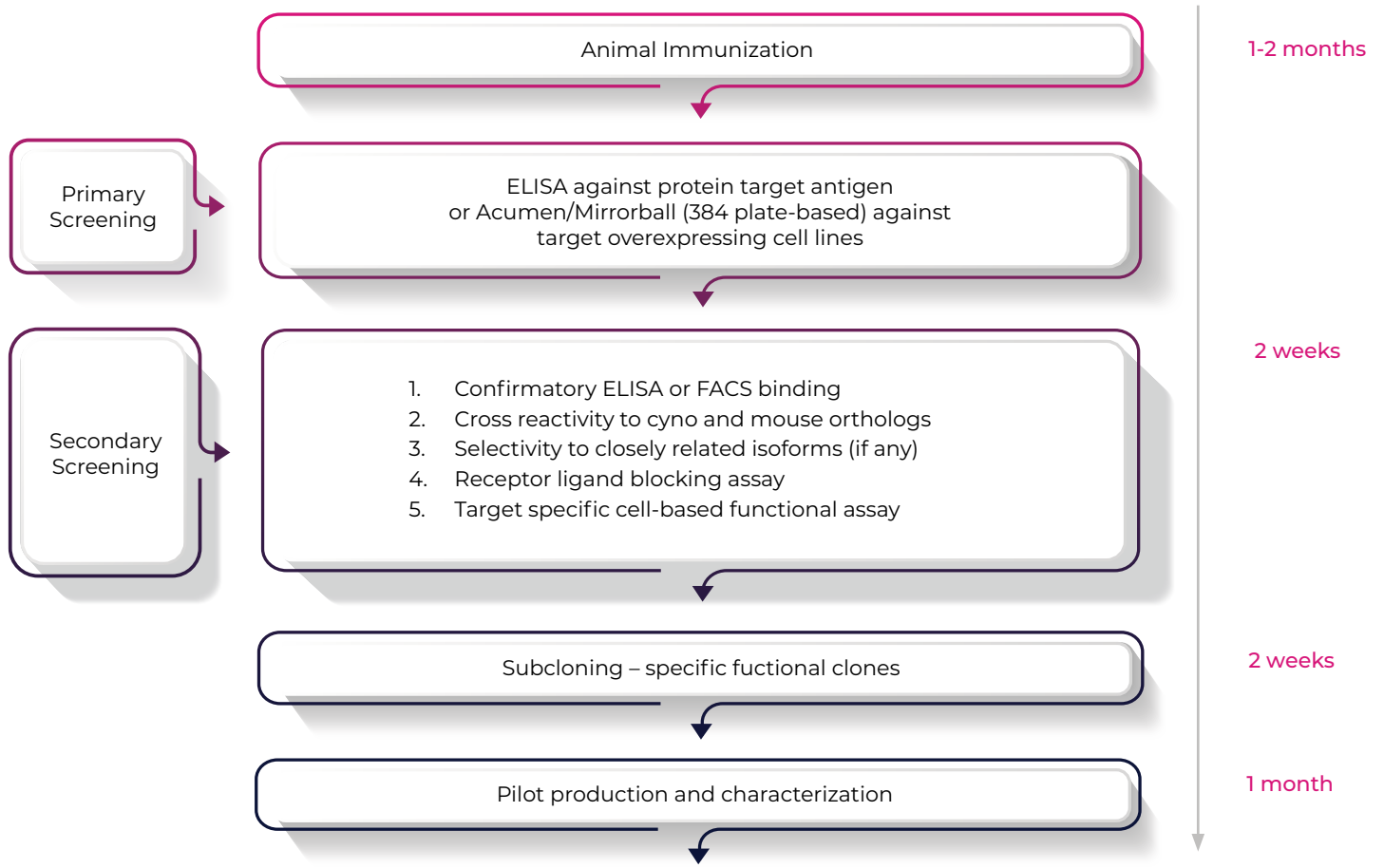
LEVERAGE CHEMPARTNER'S MULTIPLE PLATFORMS TO BEST FIT YOUR PROJECT

	PHAGE DISPLAY	HYBRIDOMA TECHNOLOGY	SINGLE B CELL CLONING
Duration	4 months	6-8 months	4 months
Repertoire	Natural or Designed	Natural (4K-10K members)	Natural (10K-50K)
Antigen	All antigens possible, challenging for GPCR/ion channels	Challenging for toxic, conserved, less immunogenic targets. More success with challenging targets.	Challenging for toxic, conserved, less immunogenic targets. More success with challenging targets.
Affinity	May need affinity maturation; Large library required to identify good binders	Usually no need for affinity maturation	Usually no need for affinity maturation
Screening Format	scFv and Fab	IgG	IgG
Benefits	Accelerated discovery, antigen flexibility. Sequence information early	No need for affinity maturation	No need for affinity maturation, greater sampling of immune repertoire, accelerated discovery, sequences early, function forward

TRACK RECORD ON CONSERVED AND CHALLENGING TARGETS

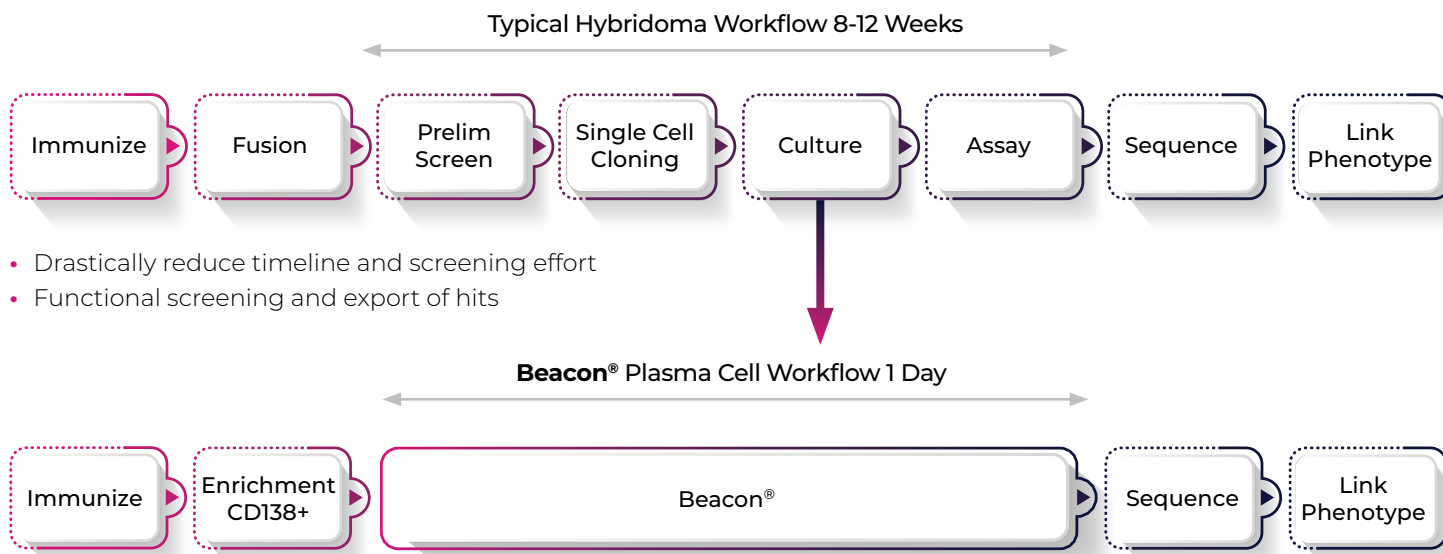
TARGET CLASS	HOMOLOGY (%)	SIZE OF ECD	IMMUNIZATION STRATEGY	# OF BINDERS	# OF FUNCTIONAL CLONES
GPCR (C5aR)	>80%	37 + 17 + 27 + 17 aa	DNA Cell	46	10
GPCR Heterodimer	98% / 91%	122 kDa + 90 kDa	Protein	78	8
GPCR	Undisclosed	Undisclosed	DNA + Nanodisc Cell+ Nanodisc	5	5
GPCR	Undisclosed	35 + 5 + 19 + 5 aa	Cell	34	17
GPCR (Apelin Receptor)	~60%	26+10+28+14 aa	Dendritic cell Cell	~200	~15
NGG2A	>90%	17 kDa	Protein + Cell DNA + Cell	16	7
TNFR Family	96%	50 aa	Protein Cell	29	Only look for binders
Type I Transmembrane	97%	~70 kDa	DNA Cell Protein	210	13
RTK Family	95%	~66 kDa	Cell	93	4
Integrin Family	93% / 92%	250 kDa	Protein + Cell DNA + Cell	37	17
Ion Channel	92%	13 + 34 aa	DNA + Protein Cell + Protein Protein	88	14
Multi-transmembrane	87% / 80%	35 + 10 aa	Cell	55	Only look for binders
Multi-transmembrane	100% ECL1	15 + 10 aa	DNA + Cell	39	14
GPCR	97%	116 + 12 + 18 + 12 aa	DNA DNA + Cell Peptide Cell Protein	38	17
Mouse Anti-mouse	100%	21 kDa	Protein (break tolerance)	17	Only look for binders
GPCR	71%	35 + 14 + 31 + 17 aa	DNA + Cell	23	Only look for binders
Integrin	92.5%	80 kDa	Protein Cell + Protein DNA + Protein	90	29 agonist + 13 blockers

REPRESENTATIVE HYBRIDOMA SCREENING FUNNEL



SINGLE B CELL CLONING WITH BEACON®

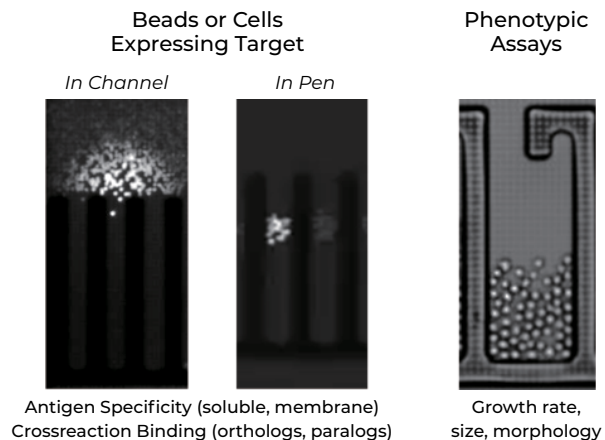
FASTER ANTIBODY DISCOVERY SOLUTIONS DELIVERED WITH PRECISION



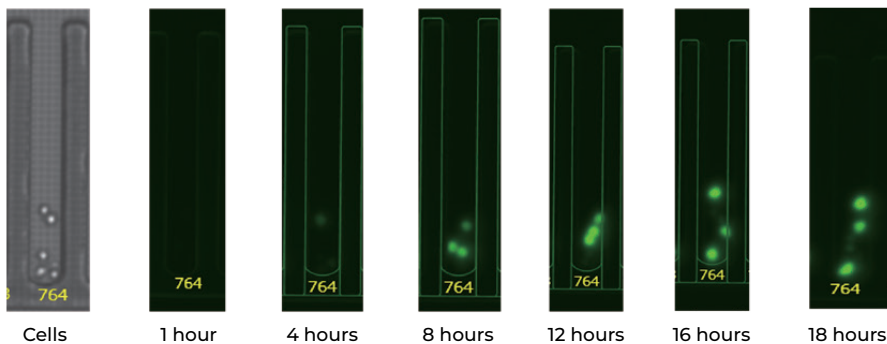
VALUE PROPOSITION

MOVING FUNCTION FORWARD FAST IN THE DRUG DISCOVERY PROCESS

- **Fast:** 4 hrs to overnight from load to exporting hits
 - **Functional hits:** Screen for functional hits in 1 day (blocker, signaling, etc.)
 - **Multiplex or sequential assays:** Screen for desired parameters
 - **High-throughput:** Thousands of individual cells interrogated in parallel
- >> Identify exceptionally rare functional antibodies in 1 day



Representative Images of **Highly Activated** Jurkat-NFkb-GFP Reporter Cells



PHAGE DISPLAY PLATFORM

STREAMLINED FULLY HUMAN THERAPEUTIC ANTIBODY DISCOVERY AND OPTIMIZATION

NAIVE LIBRARY

- Royalty-free
- Human naïve scFv library
 - PBMCs isolated from 50+ diversified human donors
 - 4×10^{10} cfu
- Alpaca naïve VHH library
 - PBMCs isolated from 20+ alpacas
 - 10^{10} cfu

IMMUNE LIBRARY

- Multiple species, including mouse, human, alpaca/llama, camel, rabbit, chicken
- Lymphocytes isolation from immunized animals
- PBMCs from diseased human individuals
- Guaranteed functional library size $>10^8$ cfu with in-frame rate $>85\%$

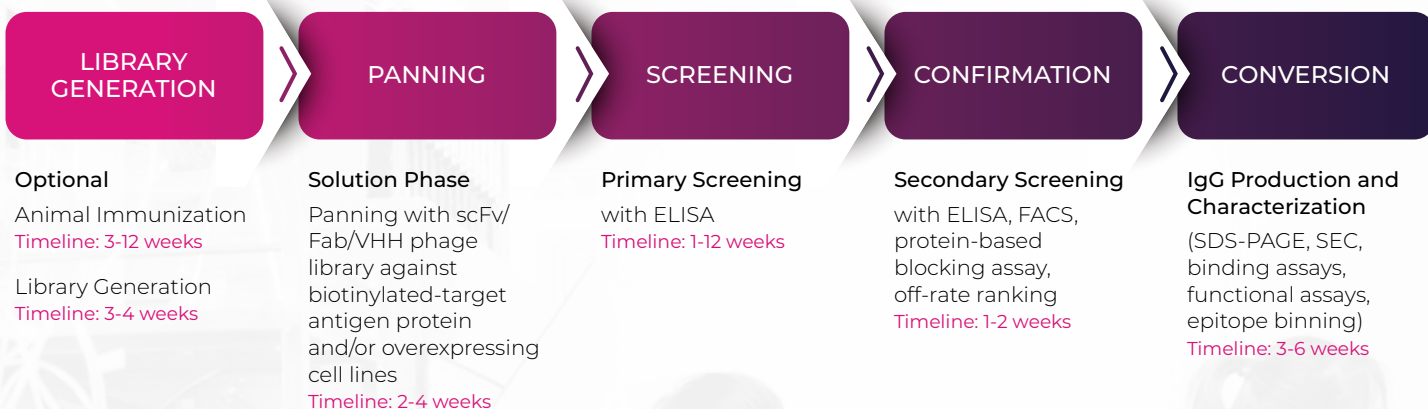
SYNTHETIC LIBRARY

- CP proprietary and royalty-free
- Fully human scFv library
 - PBMCs isolation from 50+ diversified human donors
 - 4×10^{10} cfu
- Synthetic humanized VHH library
 - PBMCs isolated from 20+ alpacas
 - 10^{10} cfu
- Peptide library
 - 12 amino acid linear peptide library
 - 17 amino acid cyclic peptide library
 - 10^{12} cfu

OPTIMIZATION

- Alanine or histidine scanning
- scFv/Fab affinity libraries constructed by CDR-targeted mutagenesis
- Library panning against Ag at various conditions
- Initial screening with ELISA and off-rate ForteBio ranking

PHAGE PANNING/SCREENING STRATEGY AND TIMELINE



ANTIBODY ENGINEERING AND LEAD OPTIMIZATION

HIGH-THROUGHPUT CHARACTERIZATION AND SHORT TURNAROUND TIME

V_H/V_L SEQUENCING AND EPITOPE ANALYSIS

- Confirm sequences by MS
- Validation by chimeric antibody production
- Epitope binning/mapping

1-2 MONTHS

SEQUENCE ANALYSIS

- Sequence alignment
- Manufacturability risk "hot spot" analysis and removal
- *In silico* immunogenicity assessment

1-2 DAYS

HUMANIZATION

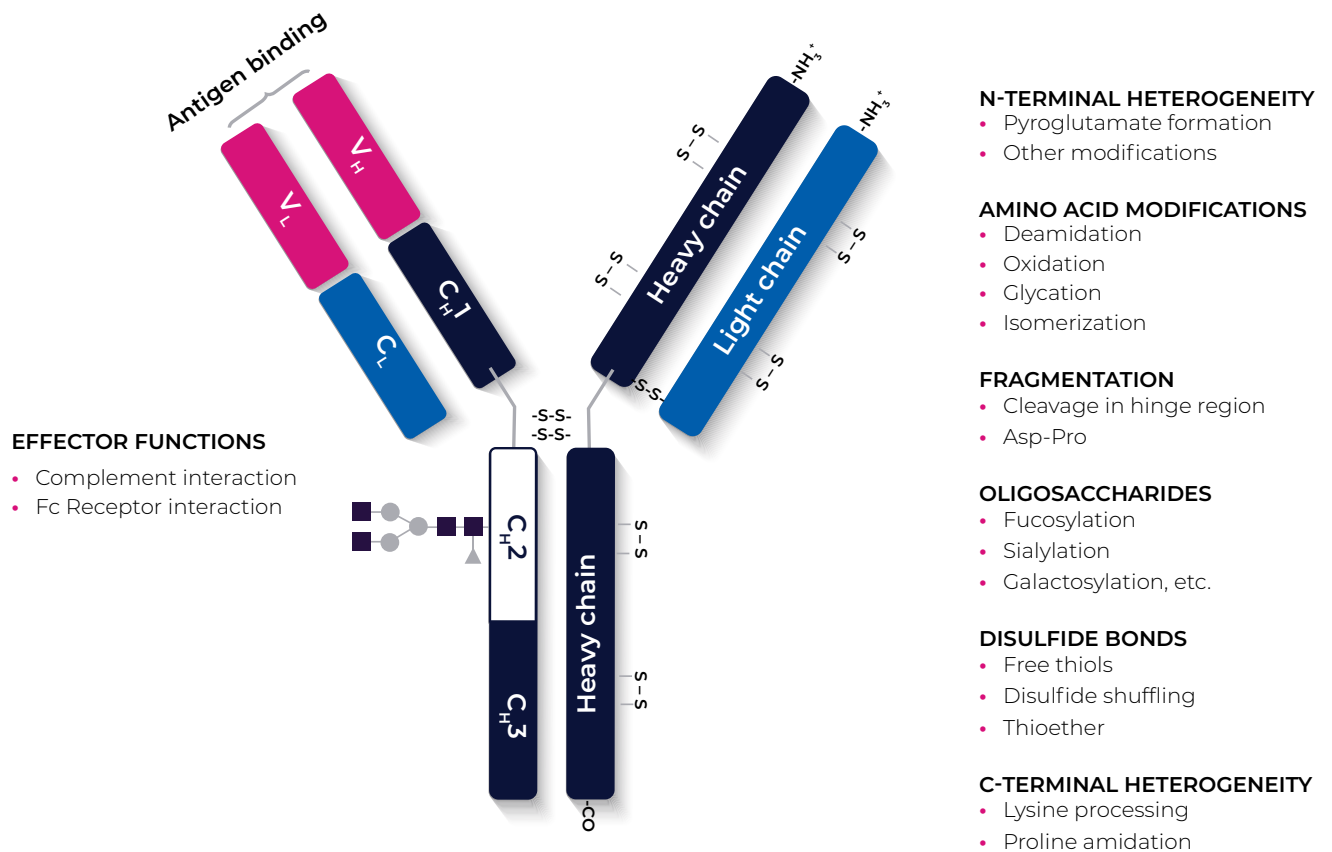
- CDR grafting and back mutation design by computer modeling
- Production of variants and characterization

4-6 WEEKS

AFFINITY MATURATION

- CDR-targeted saturated mutagenesis and phage display screening
- Variants production and characterization

3-4 MONTHS



[LEARN MORE](#)

HUMANIZATION HIGHLIGHTS

Optimized AI-based back mutation analysis

Optimal germline FW selection using local database

Localized process for maximum sequence confidentiality

Extensive project experience

COMPREHENSIVE ANALYSIS FOR HUMANIZATION DESIGN

Sequence coverage plot showing the number of homologues identified across the representative sequence

pLDDT score per position each of the top five AlphaFold models predicted

100 to 90 – high accuracy expected
 90 to 70 – backbone expected to be modeled well
 70 to 50 – low confidence, caution
 50 to 0 – should not be interpreted, may be disordered

Representative AF model

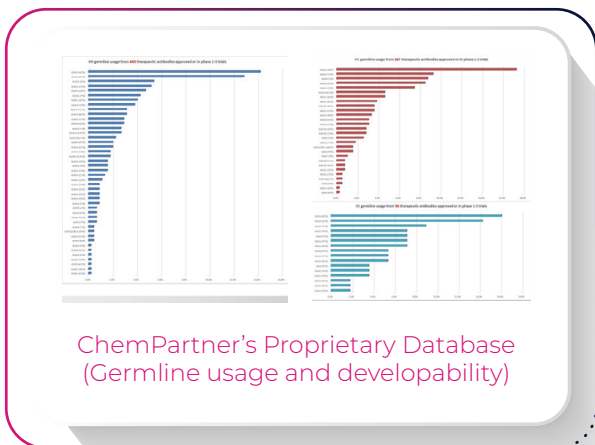
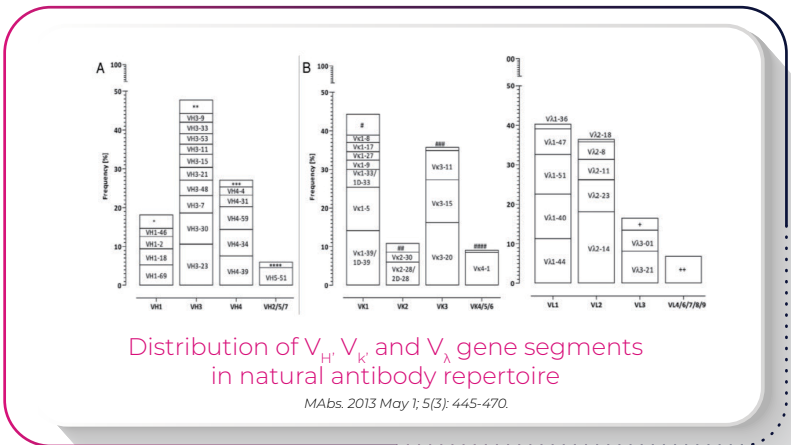
HUMANIZATION DESIGN

AI and CADD-based modeling/analysis

Germline usage in therapeutic mAbs approved and at clinical stage

V_H/V_L germline pairing frequency

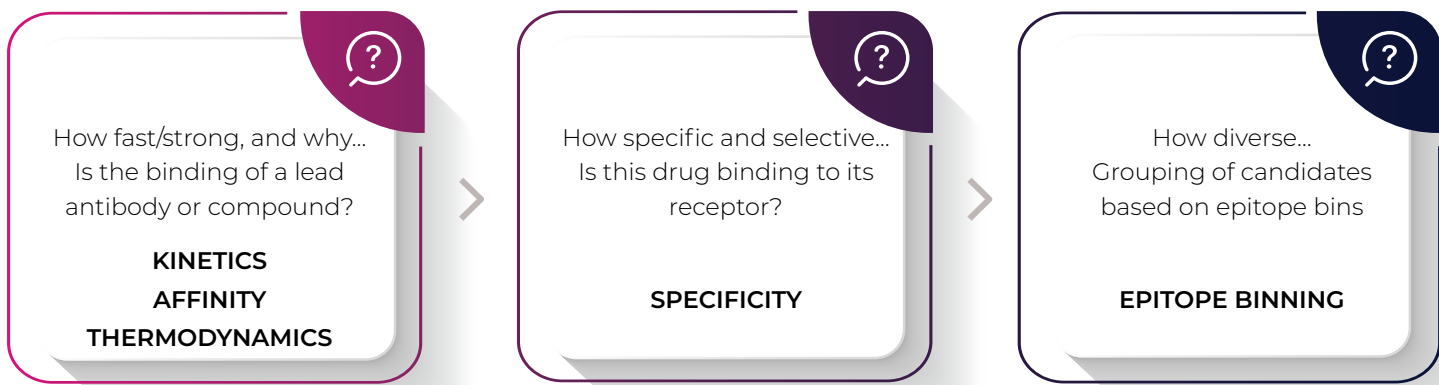
Germline distribution in natural human repertoire



STRUCTURAL BIOLOGY AND BIOPHYSICAL CHARACTERIZATION

X-RAY CRYSTALLOGRAPHY, NMR, STD, SPR, TSA, DLS, AND MORE

BIOMOLECULAR INTERACTION ANALYSIS PLATFORM



VARIOUS TYPES OF INTERACTION ANALYSIS

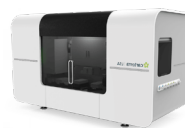
- Antibody-antigen or receptor-ligand interaction characterization: affinity, kinetics
- High-throughout compound library screening
- K_D measurement of compounds binding to target proteins
- scFv or antibodies screening and ranking
- Identifying the logical sequence of binding events for multimolecular complexes
- Epitope binning, isotyping, and cross-reactivity test of antibodies
- Analysis of bispecific antibody interactions
- Kinetics and Affinity of antibody and Fc receptors interaction for IND filing



Octet Red 384



BIAcore 8K (2X)



Carterra LSA

STRUCTURAL BIOLOGY PLATFORM

CRYSTALLIZATION AND OPTIMIZATION

- Antibody-antigen and protein-compound co-crystallization, compounds soaking
- Temperature controlled rooms and one Peltier-cooled incubator
- Pre-experiments (QC) include DLS, TSA, SPR, and CD
- Art Robbins Phoenix Crystallization Robot for HT crystal screening
- Automatic imaging system
- Various commercial and homemade screening kits
- Post-crystallization treatments

X-RAY DIFFRACTION AND DATA COLLECTION

- Rigaku XtaLab MM007Cu-HF X-ray diffractometer (CEMPS)
- Fast and convenient synchrotron access (SSRF and AS)

ELECTRON MICROSCOPY TECHNIQUE

- Negative Staining, Cryo-EM
- QC for protein complex, VLP, LNP (size, homogeneity, etc.)

STRUCTURE DETERMINATION

- Phasing by MR, SAD and MAD for crystal diffraction data
- Negative staining and Cryo-EM data processing
- Structure analysis, informatics support, docking, simulation
- Equipped with CPU and GPU workstations/clusters



ANTIBODY DRUG CONJUGATE (ADC)

CROSS-FUNCTION ADC DEVELOPMENT PLATFORM OFFERS ONE-STOP SOLUTION

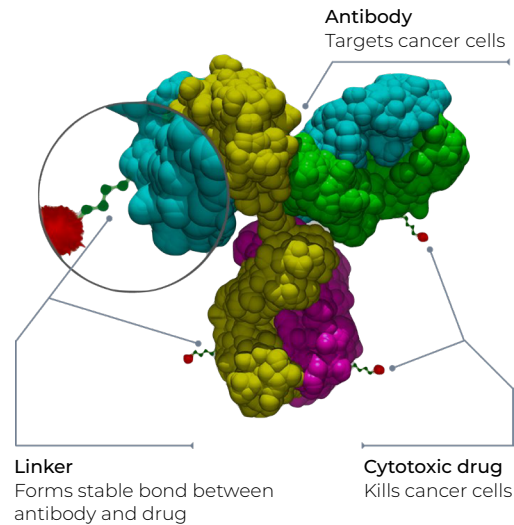
INTEGRATED ADC DISCOVERY SERVICE

PHYSIOCHEMICAL CHARACTERIZATION

DAR (HIC, RP-HPLC, CEX-HPLC, LC-MS), CE-SDS, iCIEF

IN VITRO AND IN VIVO CHARACTERIZATION

Potency, efficacy, PK/PD, serum stability, acute tox study, NHP PK/exploratory tox



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ANTIBODY DISCOVERY

Antibody generation and characterization, anti-idiotypic, anti-SMC generation

DISCOVERY CHEMISTRY

Linker (cleavable, non-cleavable) and payload design, optimization and synthesis, linker/payload catalog

CONJUGATION OPTIMIZATION

Cysteine, lysine conjugation, thiomab, sortase catalyzed terminal conjugation, MTC conjugation, click chemistry Oligo, siRNA

GENERAL WORKFLOW FOR ADC DISCOVERY AND DEVELOPMENT

ANTIBODY DISCOVERY

- Antibody candidate generation
- Pilot murine antibody conjugation
- Murine ADC validation

ANTIBODY ENGINEERING

- V_H/V_L sequencing
- Humanization and affinity maturation
- ADC-specific antibody engineering

DISCOVERY CHEMISTRY

- Common linker-payload synthesis
- Custom linker-payload modification

CONJUGATION DEVELOPMENT

- Linker-payload selection and synthesis
- Conjugation process development
- ADC product QC
- *In vitro* validation
- Gram scale production

IN VIVO EFFICACY

- Xenograft model selection & development
- Xenograft model evaluation

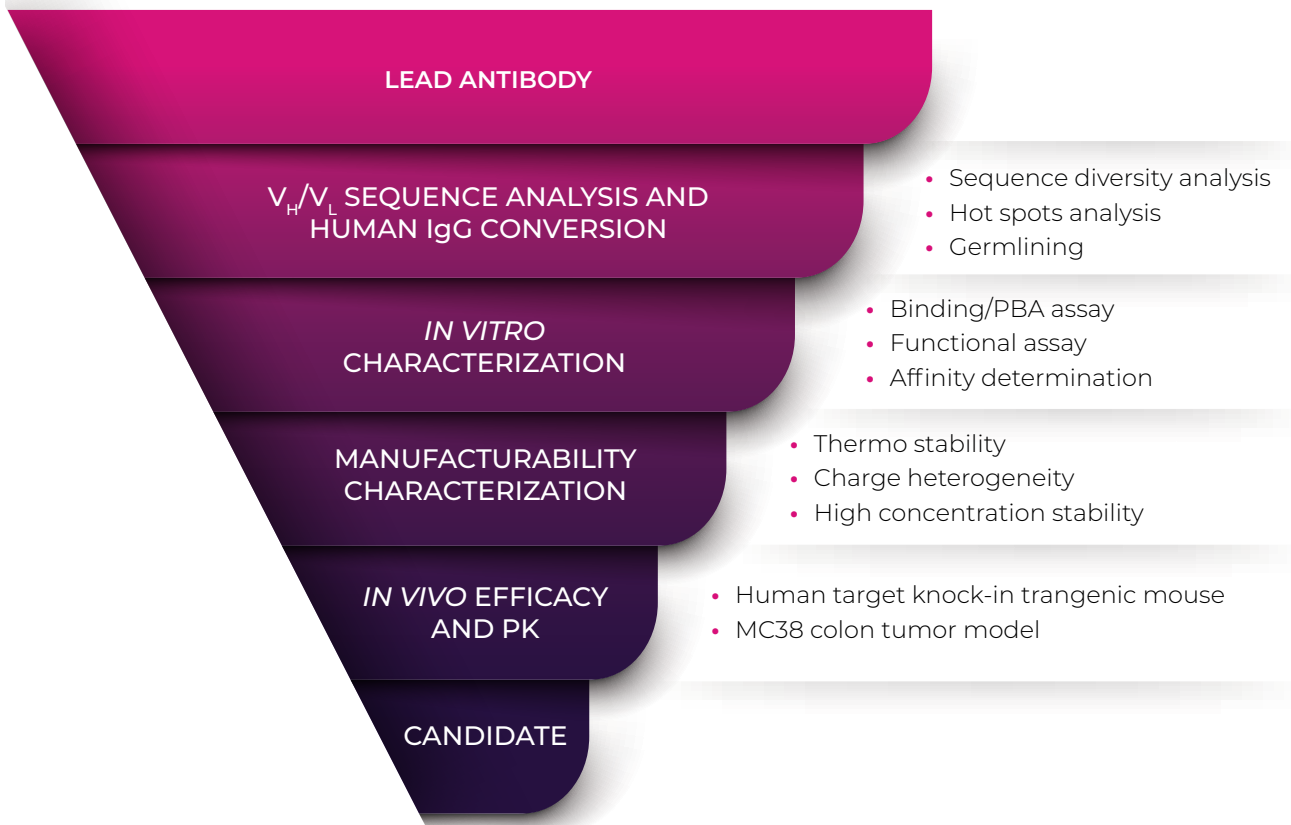
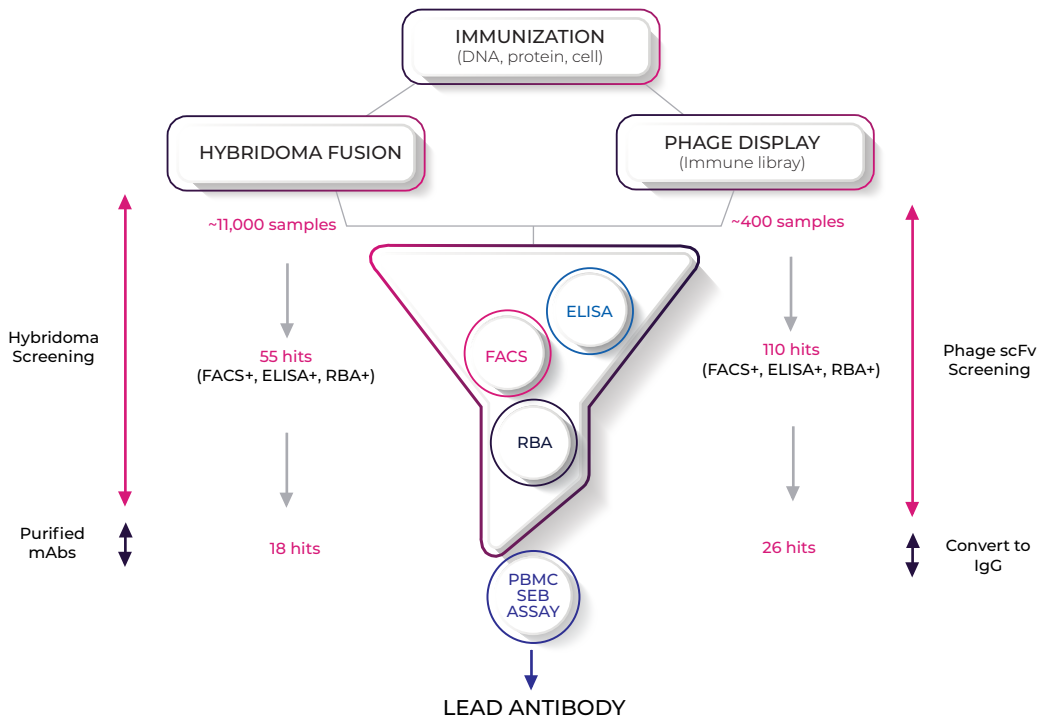
IN LIFE STUDY

- Rodent PK
- NHP PK
- Toxicology study

CASE STUDY

INTEGRATED SERVICE FOR CTLA-4 MAB DISCOVERY BY HYBRIDOMA AND PHAGE DISPLAY

LEVERAGE MULTIPLE PLATFORMS TO FIND THE BEST CANDIDATE



CHEMPARTNER

DEDICATED TO LIFESCIENCE



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