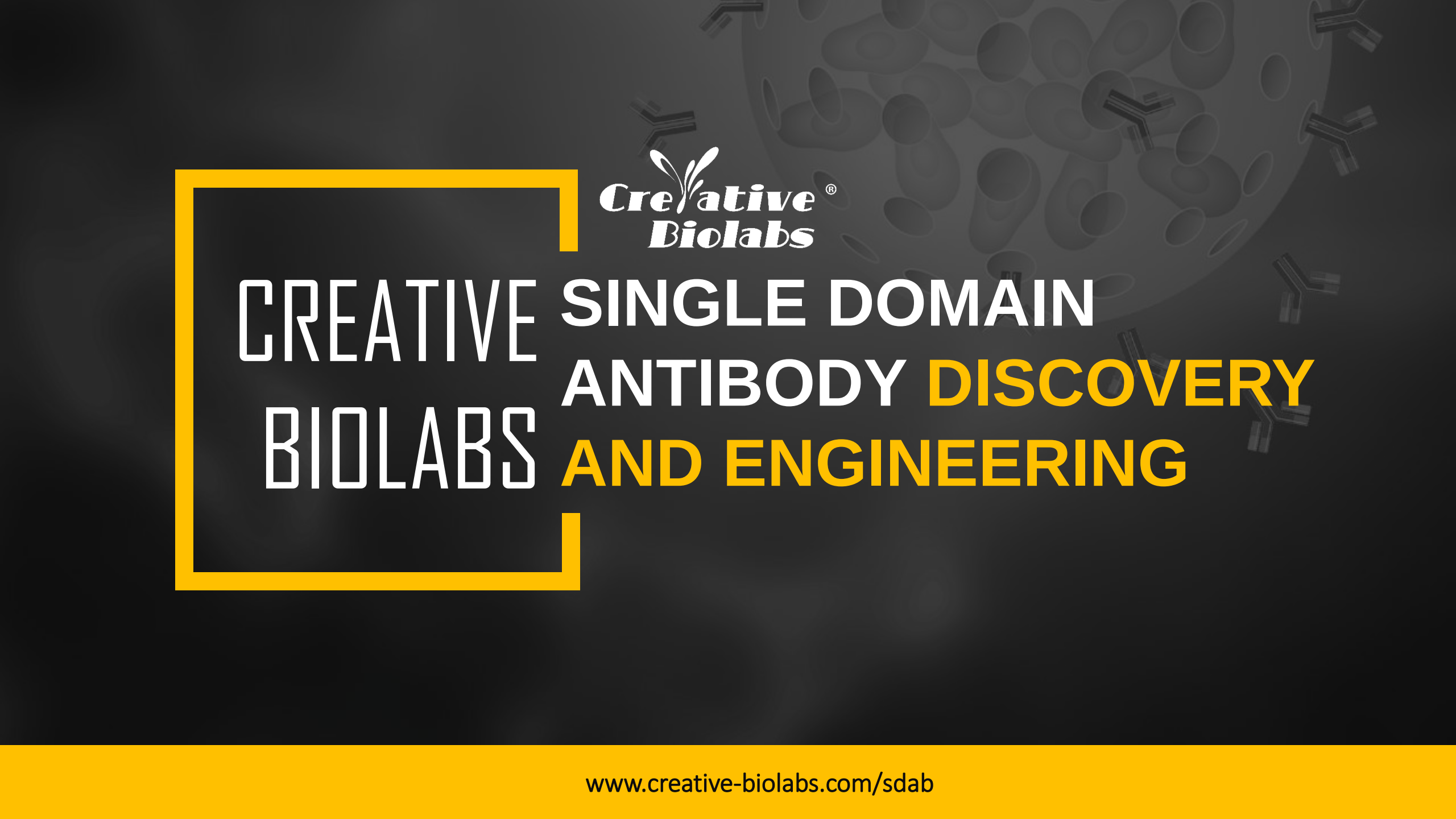

Creative Biolabs®
CREATIVE BIOLABS
SINGLE DOMAIN ANTIBODY DISCOVERY AND ENGINEERING
www.creative-biolabs.com/sdab

CONTENT

Creative Biolabs®

Over 10 Years Extensive Experience In Antibody Discovery & Development

EXCELSIOR
FLEXIBLE OPEN

High-Quality Service Provider For Researchers All Over The World!

sdAb Discovery

- ❑ Immune sdAb Library Construction and Screening
- ❑ Premade sdAb Library Screening
- ❑ Intrabody Discovery
- ❑ Anti-Membrane Protein sdAb Discovery
- ❑ Anti-Idiotype sdAb Discovery
- ❑ Anti-BBB sdAb Discovery
- ❑ Anti-Albumins sdAb Discovery
- ❑ Custom sdAb Production

sdAb Development

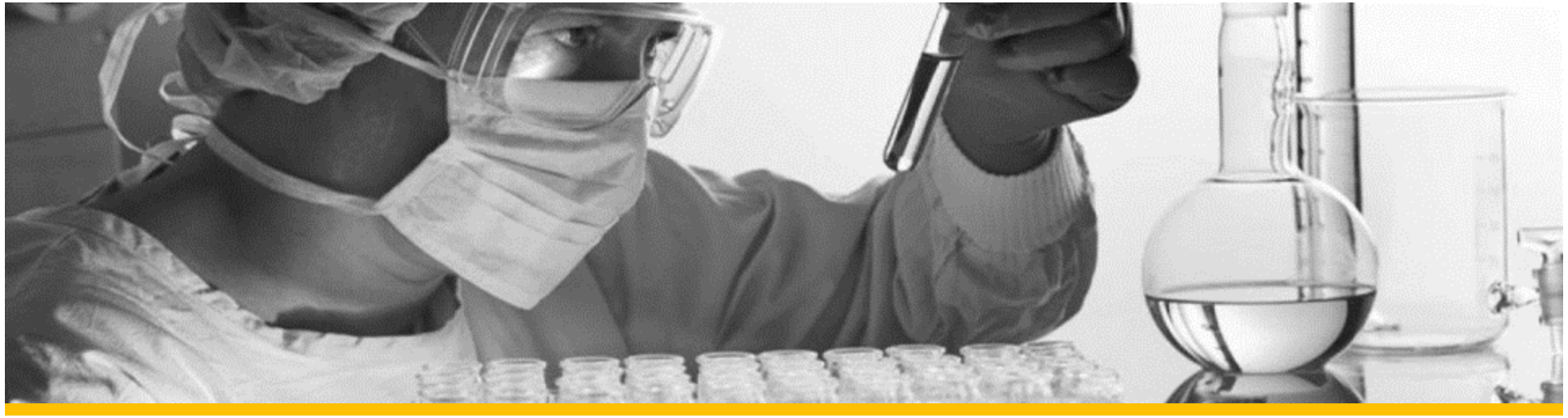
- ❑ *De Novo* sdAb Sequencing
- ❑ sdAb Affinity Maturation
- ❑ sdAb Humanization
- ❑ Bispecific sdAb Engineering
- ❑ sdAb Conjugation
- ❑ sdAb Stability Improvement
- ❑ Antibody Camelization

01

ABOUT CREATIVE BIOLABS

FIRST PART

INTRODUCTION



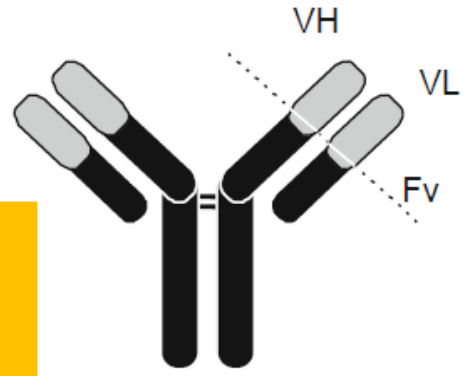
Experts in Custom Antibody Service

- ✓ Monoclonal Antibody Generation In All Species
- ✓ Affinity Maturation
- ✓ Bispecific Antibody Engineering
- ✓ Native™ Antibody Discovery
- ✓ *De novo* Antibody Sequencing
- ✓ Antibody Humanization
- ✓ Antibody Murinization, Caninization & Camelization
- ✓ Antibody Development Against Membrane Proteins
- ✓ Human Antibody Production Using Transgenic Mice
- ✓ Antibody-Drug Conjugate
- ✓ Chimeric Antigen Receptor (CAR) Services
- ✓ Immunogenicity Assessment
- ✓ Stable Cell Line Construction

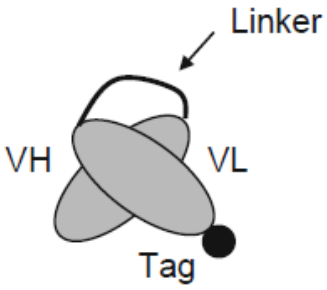
INTRODUCTION

Single Domain Antibody

also known as domain antibody, V_HH, V_{NAR} or sdAb, is a kind of antibody fragments consisting of a single monomeric variable antibody domain and lacking the light chain and CH domain of the heavy chain in conventional Fab region.

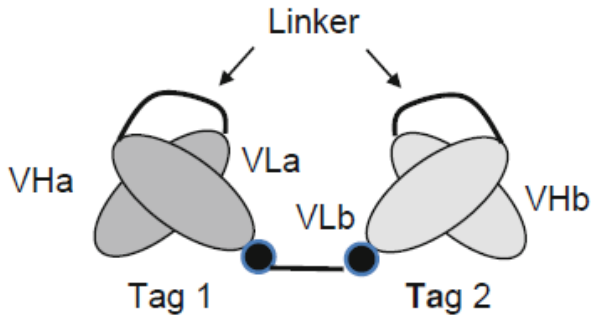


huIgG

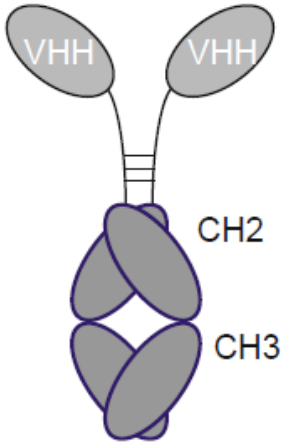


scFv

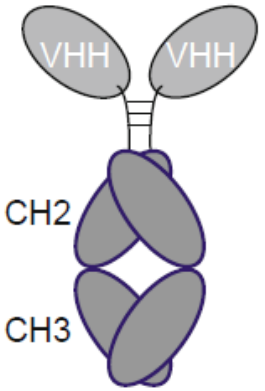
Single domain Ab (VH)



BsAb (diabody)

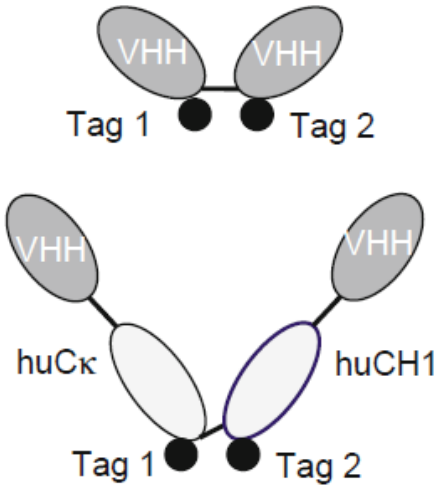


Llama IgG2 (a,b)



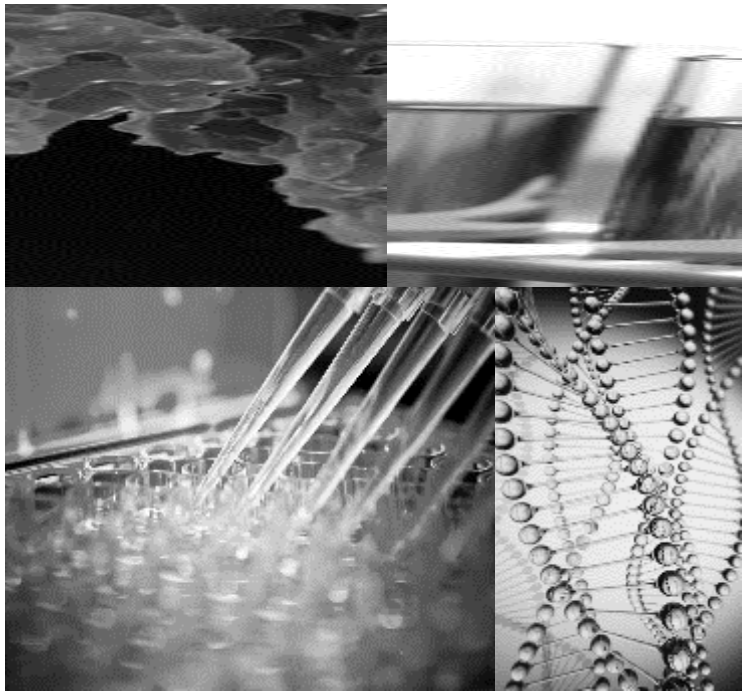
Llama IgG3

VHH



Llama BsAb

INTRODUCTION



ADVANTAGES OF sdAb

01 Smallest antibody fragment with only ~15 kDa

02 Recognize novel/hidden epitopes that conventional antibodies cannot

03 High stability to function and exist within extreme conditions and intracellular environment

04 Outstanding penetrability which is able to cross the blood-brain barrier

05 Short plasma half-life and better clearance as diagnostic tool

06 Improved bioavailability for therapeutic applications

07 Expressible in both eukaryotic and prokaryotic systems

08 Excellent chaperone for the crystallization of challenging targets

09 Great potential in downstream engineering (e.g. fusion protein and humanization)

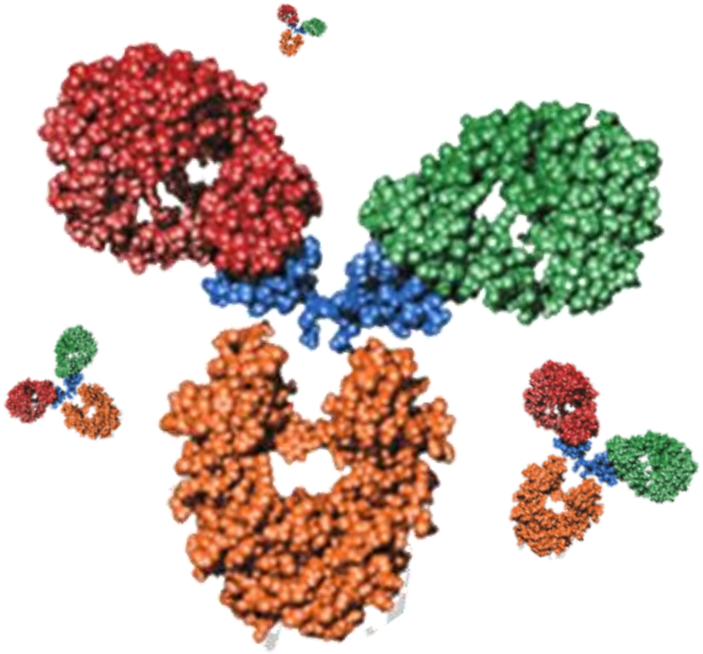
02

SINGLE DOMAIN ANTIBODY DISCOVERY

SECOND PART

CREATIVE BIOLABS

DISCOVERY



01 Immune Phage Display Library Construction and Screening

02 Premade sdAb Library Screening

03 Intrabody Discovery

04 Anti-Albumins sdAb Discovery

05 Anti-Membrane Protein sdAb Discovery

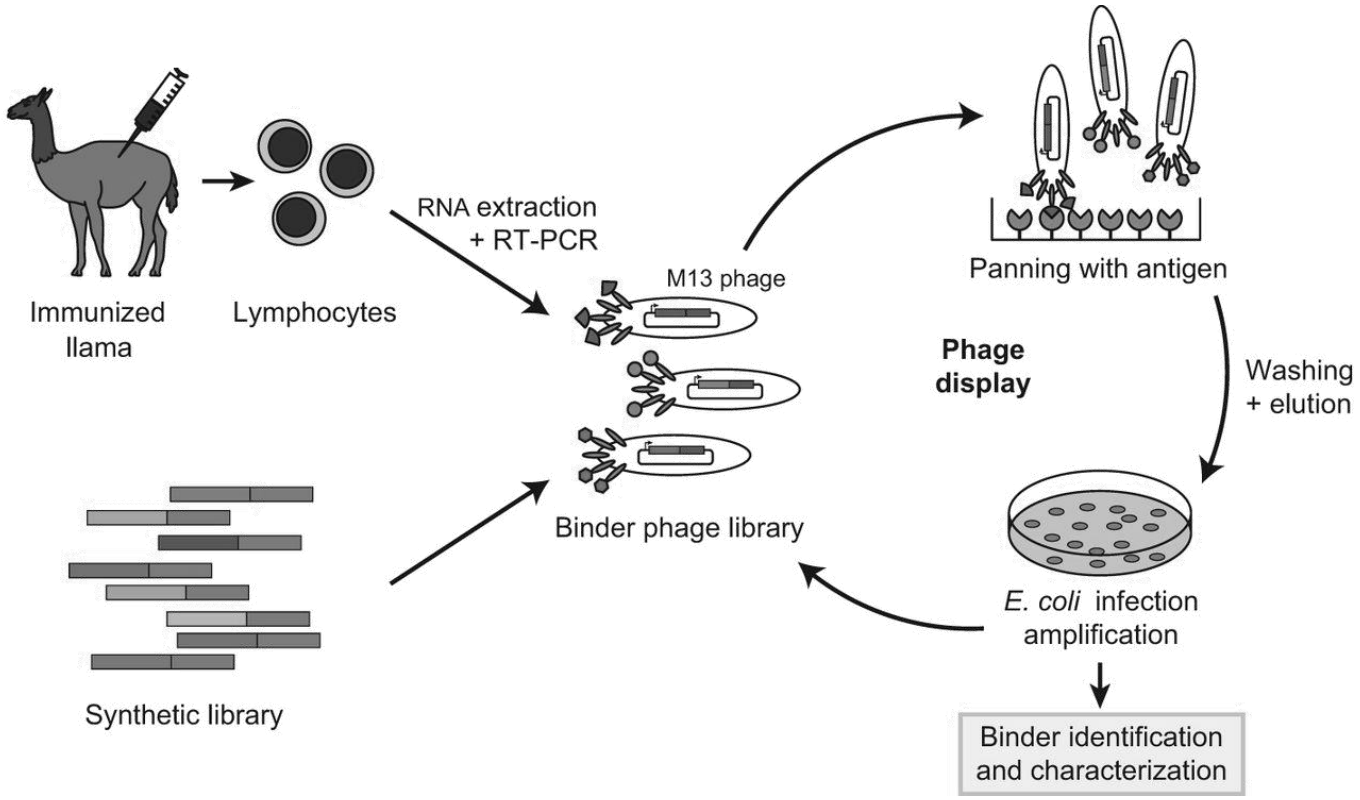
06 Anti-Idiotype sdAb Discovery

07 Anti-BBB sdAb Discovery

08 Custom sdAb Production

DISCOVERY

2.1 Immune sdAb Library Construction and Screening



Phage display is a long-lasting laboratory platform for the large-scale study of molecules interaction, such as protein-protein, protein-peptide and protein-DNA interactions and molecule selection.

Relying on engineering bacteriophages to display interested molecules on their surface, phage display can result in a linkage between genotype and phenotype.

2.1 Immune Phage Display Library Technology

DISCOVERY

2.1 Immune sdAb Library Construction and Screening

Raising sdAb Against Challenging Targets

We raised excellent phospho-specific single domain antibodies against two phosphorylation sites.

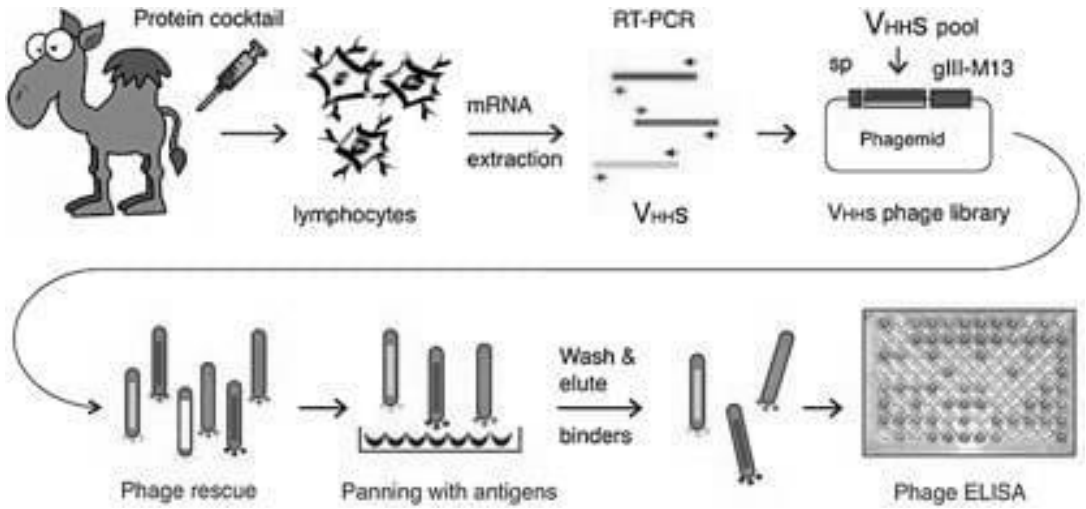
Prof. Stefan Schulz
Jena University Hospital, Institute of Pharmakology and Toxikology
Drackendorfer Str. 1, D-07747 Jena
Email: stefan.schulz@mti.uni-jena.de

We raised high-affinity monoclonal single domain antibodies against nucleotides.

Dr. Erich Koller
F. Hoffmann-La Roche Ltd.
Pharmaceutical Sciences, pRED
Building 69, Rm 155, CH-4070 Basel, Switzerland
Tel: +41 61 687 21 41
Email: erich.koller@roche.com

DISCOVERY

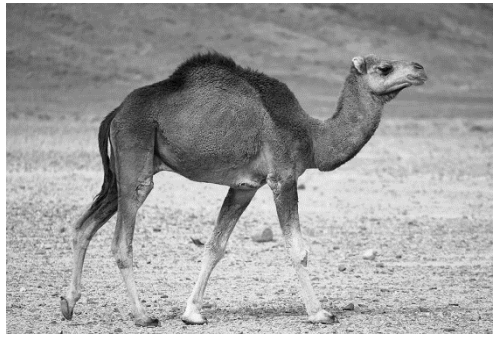
2.1 Immune sdAb Library Construction and Screening



Standard Protocol

- Animal Immunization
- RNA Isolation
- RT-PCR
- Amplification of V_HH Expression Cassette
- Ligation and Transformation
- Prepare M13KO7 Helper Phage
- Prepare Antibody Library Phages
- Antibody Library Biopanning
  - *Solid-Phase*
  - *Solution-Sorting with Plate*
  - *Solution-Sorting with Beads*
- Polyclonal Phage ELISA
- Monoclonal Phage ELISA
- DNA Sequencing
- Soluble sdAb ELISA
- Bioinformatics Analysis
- Recombinant sdAb Production

2.1 Immune sdAb Library Construction and Screening


In terms of the advanced phage display technology, **Creative Biolabs** has unparalleled capabilities for the construction of V_HH or V_{NAR} based single domain antibody libraries through immunized camel, llama, alpaca or shark.

Our scientists have vast experience constructing and screening immunized phage display sdAb libraries. We usually obtain immunized sdAb libraries with an overwhelming capacity of 10-100 million that can derivate antibodies with excellent affinity/specificity.

2.1 Immune sdAb Library Construction and Screening

THE PARTNER ANIMAL FACILITY

We commonly cooperate with a USDA registered research facility that has NIH/OLAW assurances. This is an approved blood collection facility under EC 1069/2009 for export of animal blood products to EU countries. The NIH and USDA assurances as well as EC 1069/2009 assurance are available upon request.

2.1 Immune sdAb Library Construction and Screening

Standard Immunization Procedure
(3-week interval)

We are open to perform custom immunization procedure to meet your specific requirement

High-quality RNA will be extracted at the same day after the production bleed to ensure the best starting material for library construction.

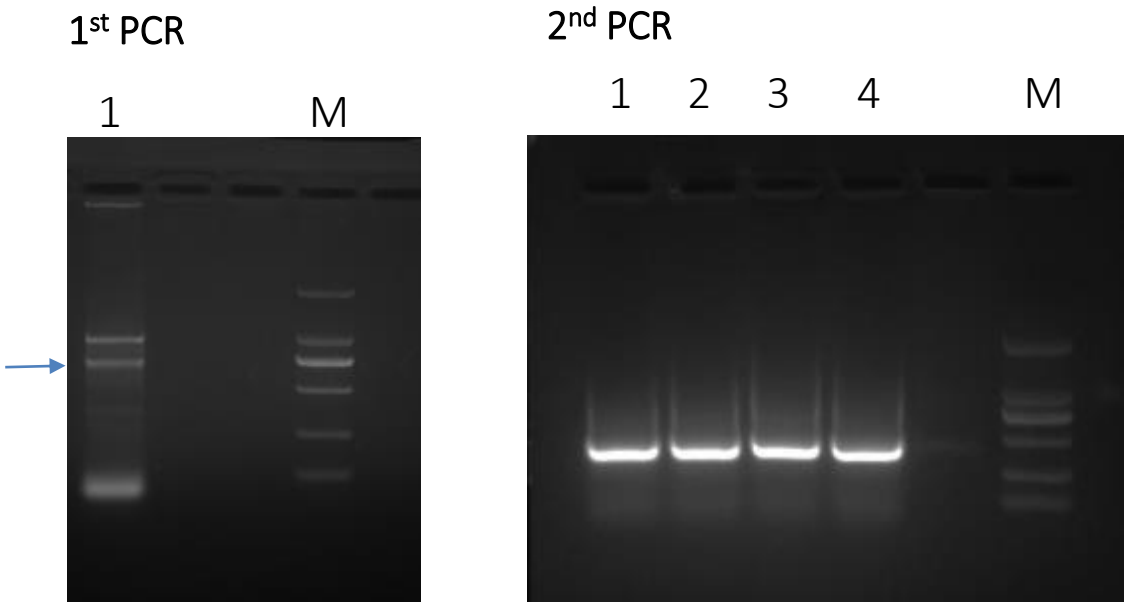
Day	Procedure
0	Primer Injection & Pre-bleed. 20 mL serum per animal. Inject antigen mixed 1:1 with CFA.
21	2nd Injection. Inject antigen mixed 1:1 with IFA.
42	3rd Injection. Inject antigen mixed 1:1 with IFA.
49	1st Test bleed.
63	4th Injection. Inject antigen mixed 1:1 with IFA.
70	2nd Test bleed.
84	1st Boost (Option). Inject antigen mixed 1:1 with IFA.
91	3rd Test bleed.
105	2nd Boost (Option). Inject antigen mixed 1:1 with IFA.
112	Production bleed/whole blood with heparin.

2.1 Immune sdAb Library Construction and Screening

Phage Display Antibody Library Construction

Degenerate primers have been used to amplify the V_HH fragments and generated V_HH libraries for the corresponding species (llama, alpaca or camel).

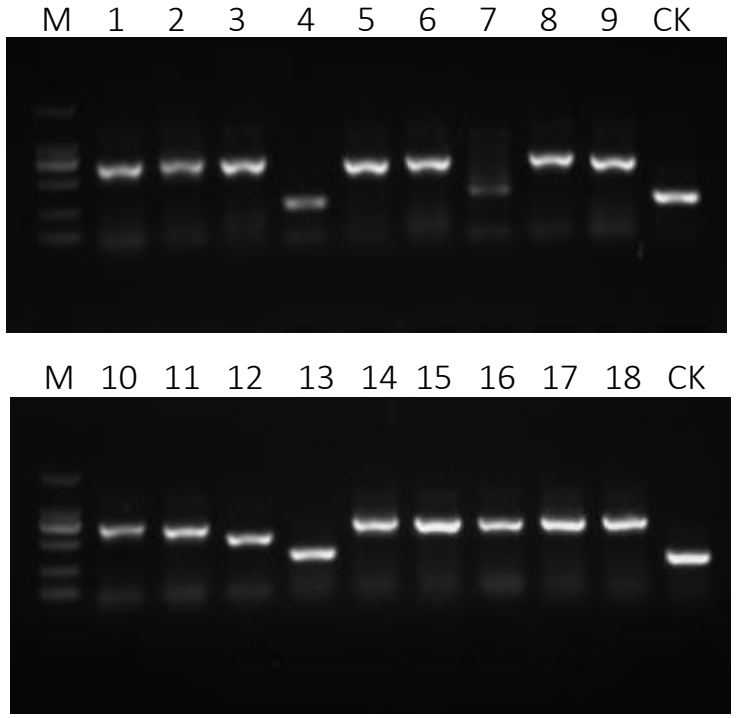
Creative Biolabs has designed and validated degenerate primers for amplifying V_HH-Fc gene and V_HH gene. We have used these primers to generate V_HH libraries that can be expressed on the surface of bacteriophage with our pCDisplay vector.



2.1 Immune sdAb Library Construction and Screening

Library QC (Sample Report)

- According to the example, 18 random clones from the end library was subjected to QC colony PCR. 14 out of 18 clones carry sense V_HH genes.
- Random clones from the end library was subjected to DNA sequencing.



Lane1-18: PCR products for random clones from the end library.

Lane CK: PCR products with the empty phagemid as the template, negative control.

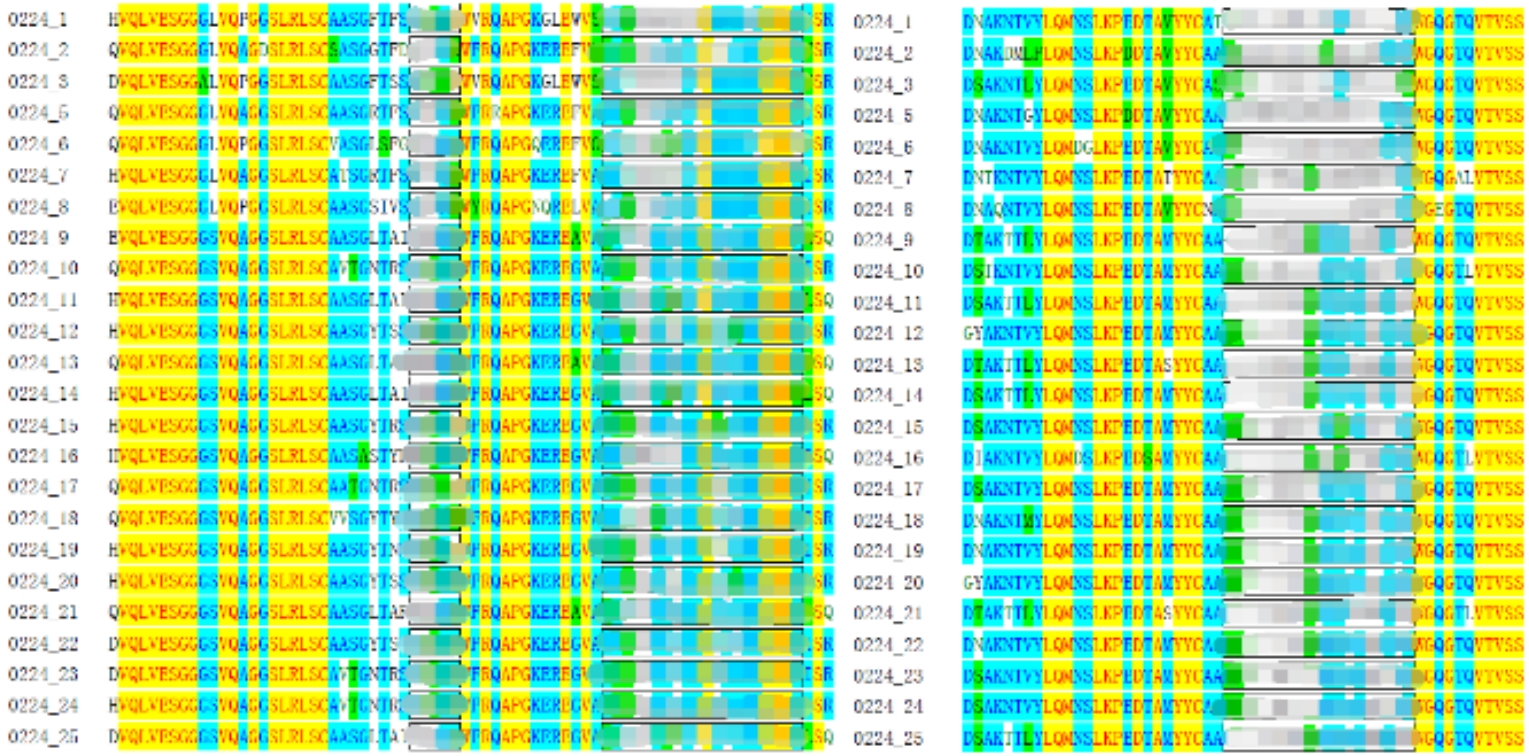
Lane M: DL2000 DNA Marker (2000,1000, 750, 500, 250, 100 bp)

DISCOVERY

2.1 Immune sdAb Library Construction and Screening

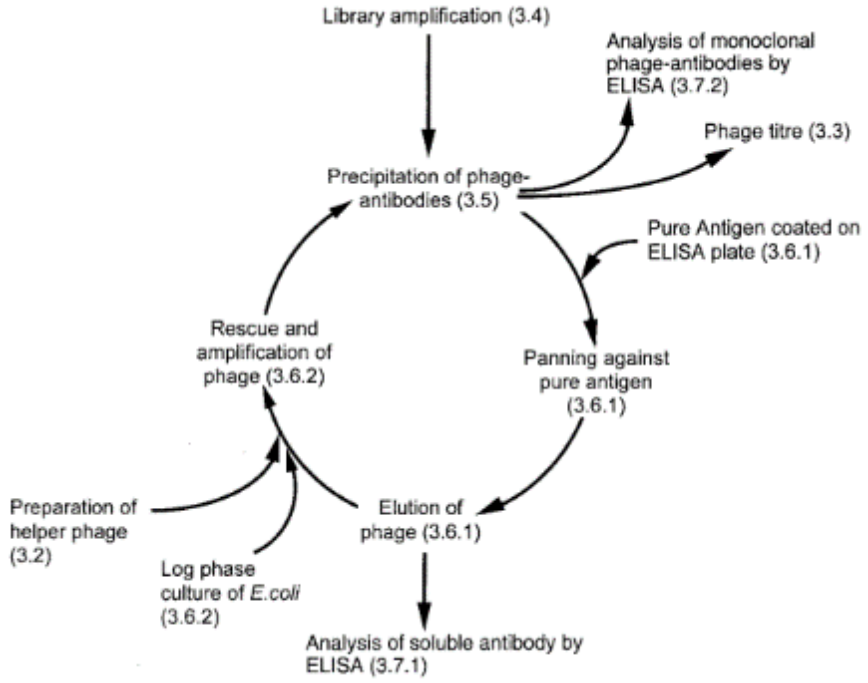
Library QC (Sample Report)

- The V_HH sequences were aligned together.
- All sequences are unique, indicating good diversity of the end library.

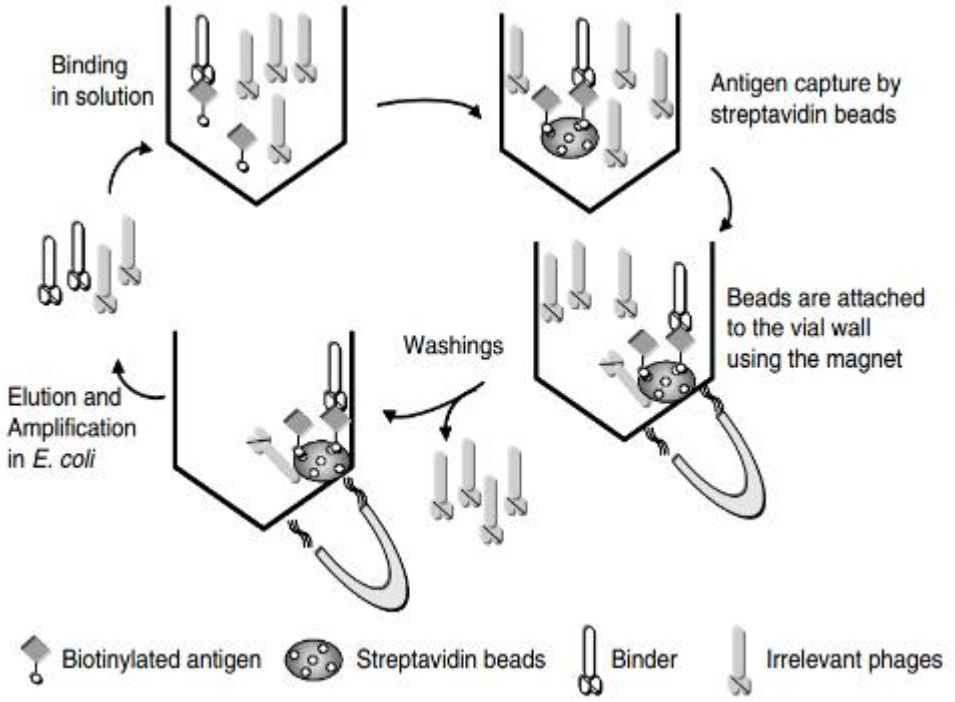


2.1 Immune sdAb Library Construction and Screening

Library Screening Strategies



Option 1. Solid-Phase Screening



Option 2. Solution-Sorting Screening (plate or beads)

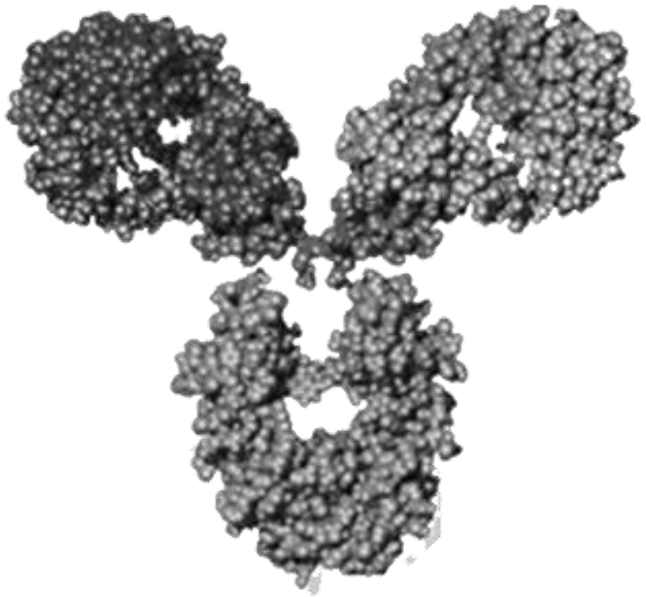
2.1 Immune sdAb Library Construction and Screening

Example of Screening Report

Round	*Conditions*	*Input*	*Output*	*Enriching factor*
1st	Target protein: 50 μg/mL AG3 Washing: 0.1% Tween20 PBST, 9 times Elution: Trypsin digestion Pre counter select: 2% M-PBS	2.40×10^{11}	2.72×10^{4}	8.81×10^{6}
2nd-P	Target protein: 30 μg/mL AG3 Washing: 0.1% Tween20 PBST, 9 times Elution: Trypsin digestion Pre counter select: 2% M-PBS	2.80×10^{11}	1.44×10^{5}	1.94×10^{6}
2nd-N	Target protein: no coating Washing: 0.1% Tween20 PBST, 9 times Elution: Trypsin digestion Pre counter select: 2% M-PBS	3.50×10^{10}	1.12×10^{3}	3.13×10^{7}
3rd-P	Target protein: 30 μg/mL AG3 Washing: 0.1% Tween20 PBST, 9 times Elution: Trypsin digestion Pre counter select: 2% M-PBS	3.32×10^{11}	8.96×10^{6}	3.71×10^{4}
3rd-N	Target protein: no coating Washing: 0.1% Tween20 PBST, 9 times Elution: Trypsin digestion Pre counter select: 2% M-PBS	1.84×10^{10}	1.02×10^{3}	1.81×10^{7}

2.1 Immune sdAb Library Construction and Screening

Binder Selection Strategies



Phage amplification of binder phage clones obtained from enriched phage library. Verify the specific binders, including:

- Phage amplification
- Phage ELISA against the target
- Phage DNA extraction
- Phage DNA sequencing

2.1 Immune sdAb Library Construction and Screening

Example of Phage ELISA

Sample	OD_{490}	
	Coating: AG3	no coating
1-A	0.241	0.072
2-A	0.476	0.074
M13KO7	0.173	0.083
1% M-PBS	0.137	0.072
Positive control [serum]	1.573	

1-A: amplified phages of the 1st eluate
2-A: amplified phages of the 2nd eluate
Primary antibody: rabbit anti-M13 pAb
Secondary antibody: HRP-goat anti rabbit pAb

Clones	OD_{490}	
	Coating: AG3	No coating
1	0.631	0.091
2	0.691	0.092
3	0.321	0.083
4	0.635	0.081
5	0.702	0.090
6	0.716	0.098
7	0.268	0.097
8	0.519	0.090
9	0.649	0.091
10	0.697	0.093
11	0.777	0.085
12	0.632	0.090
13	0.725	0.087
14	0.726	0.108
15	0.665	0.095
16	0.671	0.093
17	0.666	0.095
18	0.682	0.095
19	0.707	0.091
20	0.751	0.091
21	0.721	0.087
22	0.718	0.093
23	0.713	0.096
24	0.690	0.083
25	0.651	0.085
26	0.690	0.079
27	0.682	0.076
28	0.611	0.079
29	0.656	0.076
30	0.710	0.079
31	0.691	0.085
32	0.622	0.079
33	0.644	0.101
34	0.682	0.096
35	0.654	0.088
36	0.648	0.097
37	0.677	0.083
38	0.669	0.098
39	0.653	0.101
40	0.620	0.091
M13KO7	0.166	0.081
1%M-PBS	0.127	0.072
Positive control [serum]	1.588	

DISCOVERY

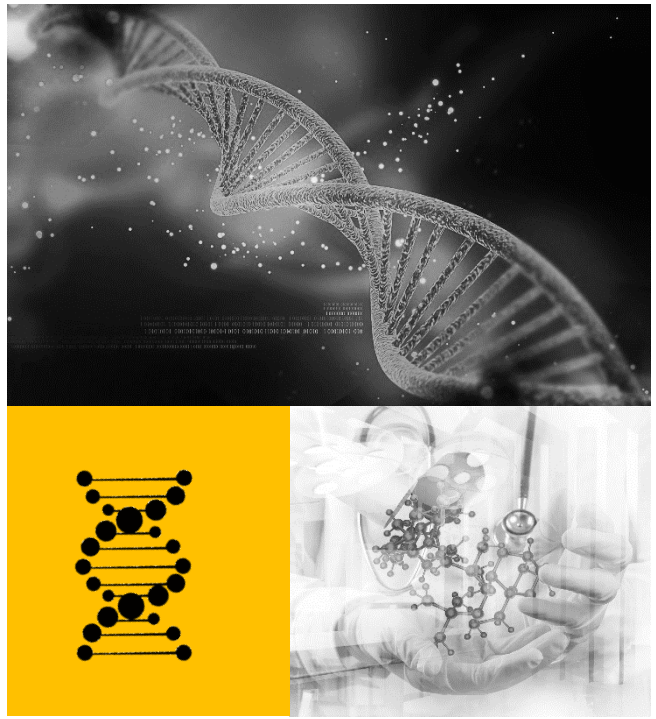
Magic™ Therapeutic Antibody Discovery Platform

As a pioneer and undisputed global leader in antibody discovery and manufacture, **Creative Biolabs** has established the exclusive Magic™ Therapeutic Antibody Discovery Platform (MTADP) to obtain all possible promising antibodies in phage display library.

For diagnostic and therapeutic antibody production, the only way to get good antibodies with all required properties is to have a large number of antibody candidates first. It is very common that a suitable antibody (pair) can only be discovered from 100-300 regular binders raised using different methods in different animals, thus have very diverse properties and sequences.

DISCOVERY

Magic™ Therapeutic Antibody Discovery Platform



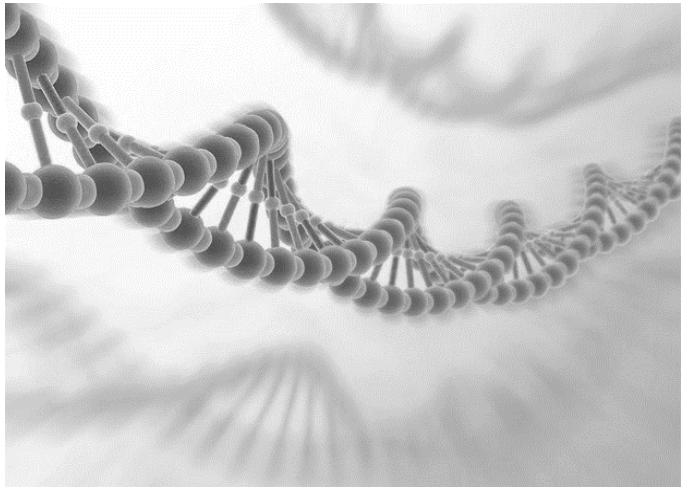
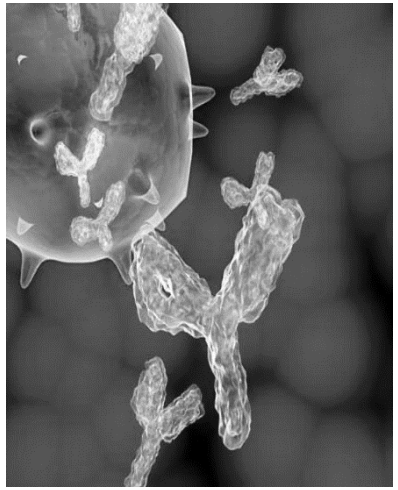
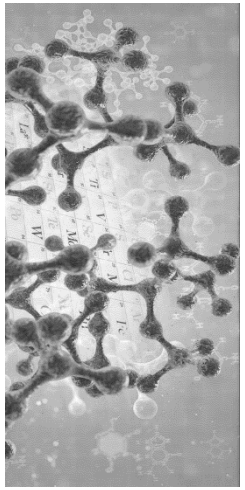
Identification of all the potential candidates in antibody library is a critical step in single domain antibody development. An enriched library derived from phage display could consists of millions of clones which is not possible to be covered by the conventional validation methods.

As a solution to these problems, our unique Magic™ platform is all about time to results. The more antibodies you can get from the screening, the more and more reliable-functional antibodies you can send for downstream evaluation.

Through this powerful platform, a large number of antibody candidates specific for the target can be isolated at one time. Once antibodies targeting different epitopes with different affinity and specificity are obtained, we are able to fast and precisely identify the clones with the highest affinity and specificity.

DISCOVERY

Magic™ Therapeutic Antibody Discovery Platform

01 **High Success Rates**

We have a proven record of successfully selecting the antibodies with high affinity and specificity using Magic™ Platform.

02 **Rapid Turn Around**

Receive results as soon as 4-6 weeks.

03 **Cost-effective**

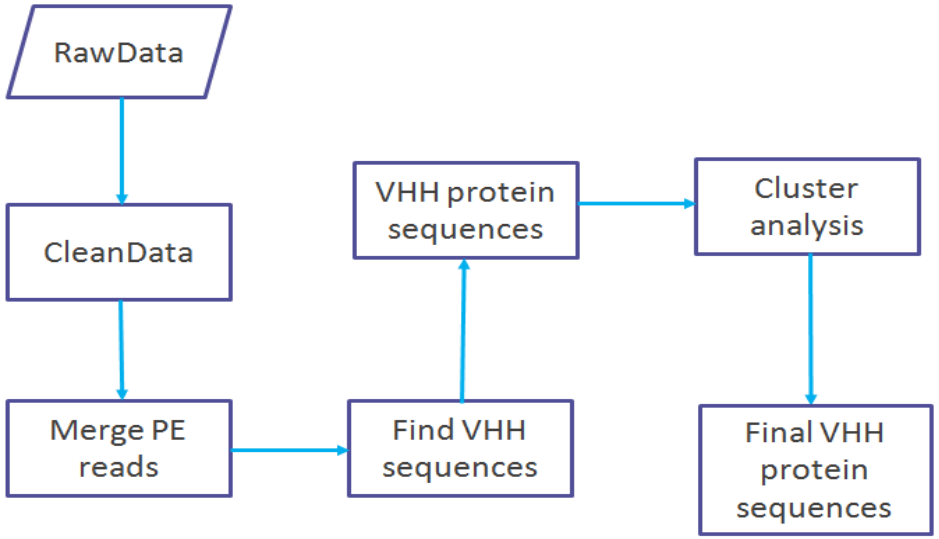
Our high-quality data and high success rates ensures the identification of all possible candidates in the library, avoids costly repeat of conventional selection, which saves your money and time in ultimate.

DISCOVERY

Over Ten Times New Binders Discovered From Magic™ Platform (Sample Report)

Project Description

- A phage display V_HH antibody library was constructed with a diversity of ~10^8.
- After the biopanning and ELISA validation, 5 V_HH was discovered from the enriched library.
- In order to cover all the diversity of the enriched sub-library, Magic™ Platform was performed to investigate the V_HH pool.



Expectations	
NucFreq	Nucleotide sequence and abundance
ProFreq	Protein sequence and abundance

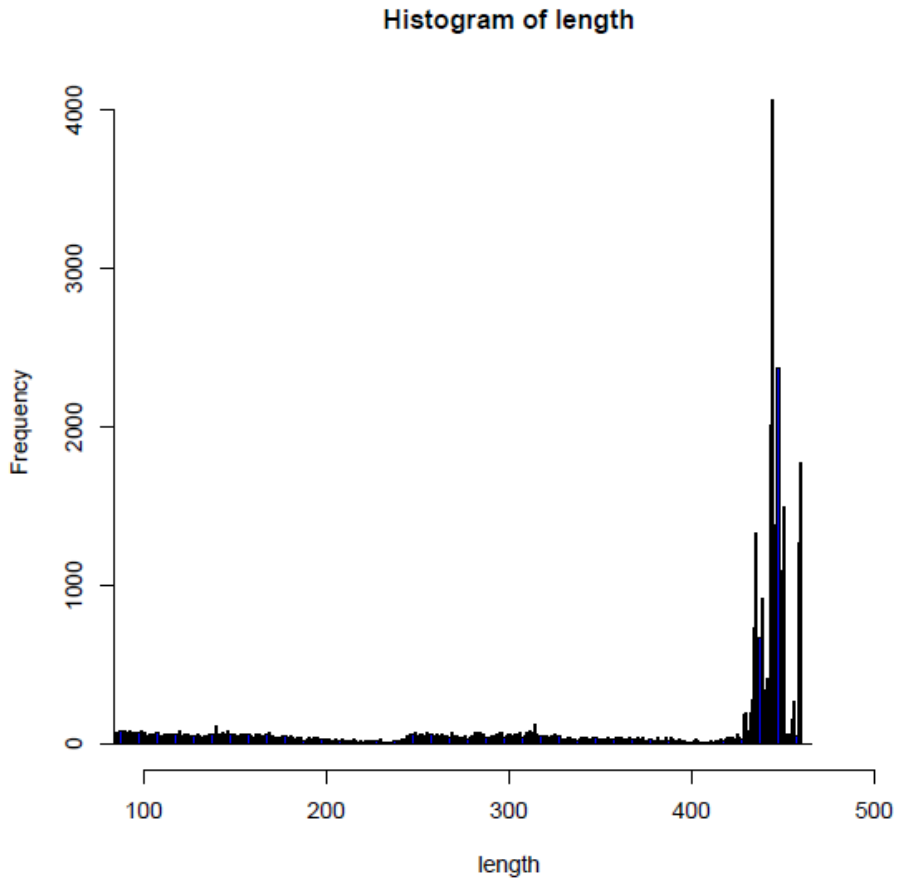
DISCOVERY

Over Ten Times New Binders Discovered From Magic™ Platform (Sample Report)

Most sequences centered around 450 bp

Sequence pattern (* stand for target sequence):

GTTATTACTCGCAGCAAGCGGCGCGCATGCC***** GC TAGCGAACAAAAACTCATCTCAGAAGAGGATCT



DISCOVERY

Over Ten Times New Binders Discovered From Magic™ Platform (Sample Report)

V_HH Protein Sequences (Raw)

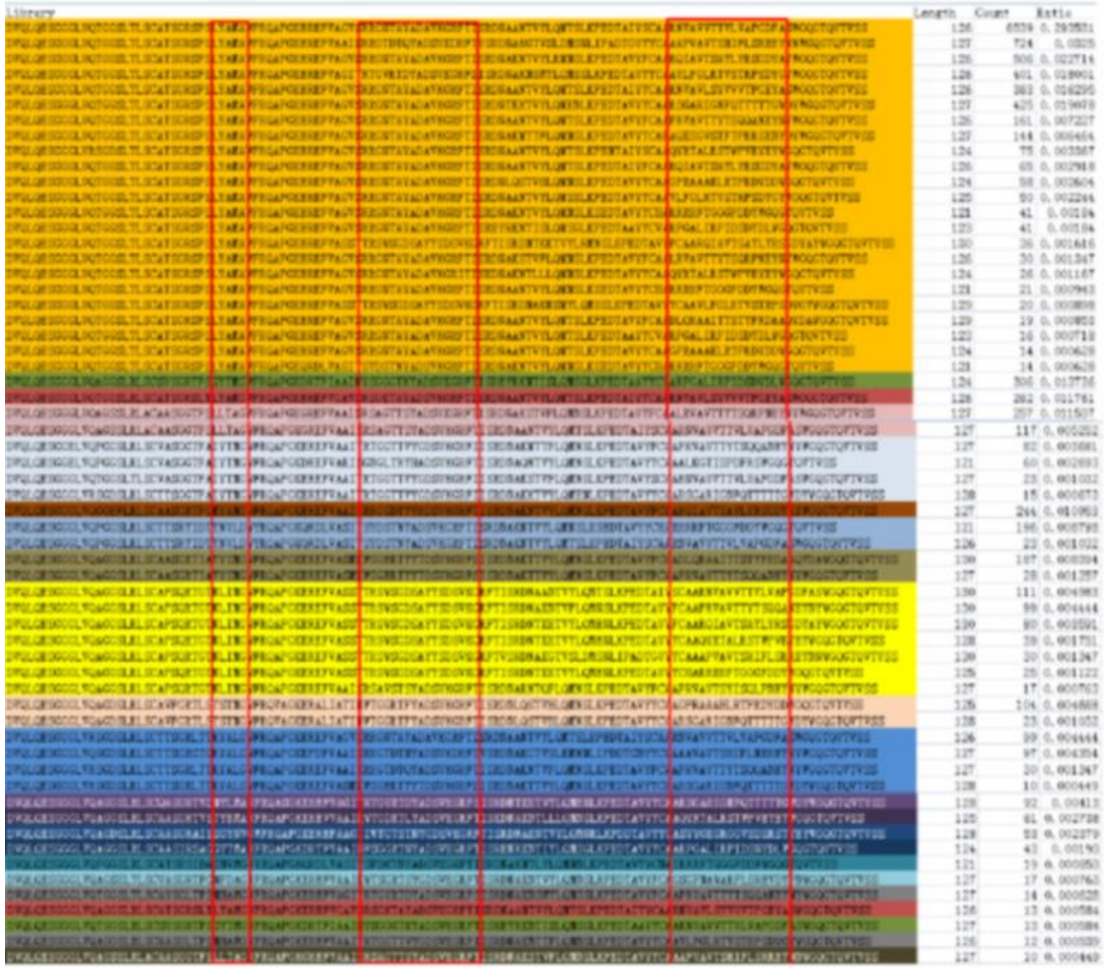
Compared with the five V_HH binders rediscovered using the conventional method

DISCOVERY

Over Ten Times New Binders Discovered From Magic™ Platform (Sample Report)

V_HH Protein Sequences (Clustered)

- 61 V_HH binders have been identified.
- These new sequences have been separated into 22 groups according to the characteristics of CDR domains and labeled with different colors.



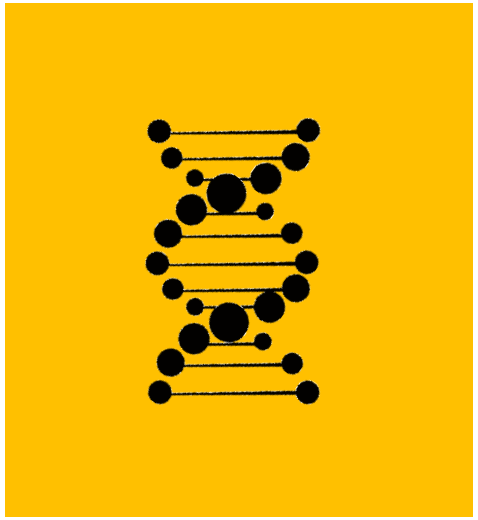
DISCOVERY

Over Ten Times New Binders Discovered From Magic™ Platform (Sample Report)

Result Summary

- From the conventional strategy, 5 different sequences were discovered, and they are rediscovered by the Magic™ Platform. The most frequent sequences found in the conventional method are corresponding to the most abundant cluster in the Magic™ result.

- Through the Magic™ Platform, we found **56** NEW V_HH binders. These new discovered sequences have been clustered into 22 groups according to the characteristics of CDR domains.



2.2 Premade Phage Display V_HH Library Screening

CREATIVE BIOLABS
Quality / Science / Dedication

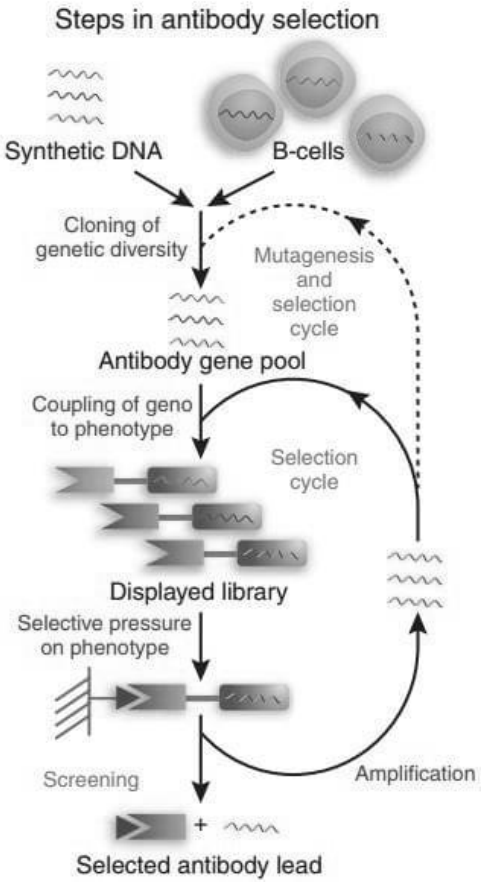
Libraries	Display Technology	Library Format	Species	Library Size
CaV_HHL-1	Phage Display	Naïve V_HH	Camel	1.5×10^9
CaV_HHL-2	Phage Display	Naïve V_HH	Camel	2.0×10^9
$LlaV_HHL$-1	Phage Display	Naïve V_HH	Llama	2.0×10^9
HuSdL-1	Phage Display	Camelized synthetic V_HH	Human	1.5×10^9
HuSdL-2	Phage Display	Camelized synthetic V_HH	Human	2.5×10^{10}

2.2 Premade Phage Display V_HH Library Screening

Creative Biolabs has built up a HuSdL™ Human Single Domain Antibody Library that allows rapid discovery of large numbers of high-potency camelized human single domain antibodies against any therapeutic targets.

- Most robust and straightforward
- Low immunogenicity: our library produces camelized human antibodies that have a human origin, thus the lowest immunogenic potential in humans, especially for long-term and multiple-dose administration.
- Adequate developability: the library was preselected based on the thermostability and expressibility (in *E. coli*) of the displayed antibodies. In particular, in the library, the antibody repertoire was heat-treated to remove clones that could not withstand heat-induced aggregation.

2.2 Premade Phage Display V_HH Library Screening



Our premade single domain antibody library was constructed based on either **camelized human VH3** in FR2 or **naïve camelid** V_HH repertoire.

Accepted Targets:

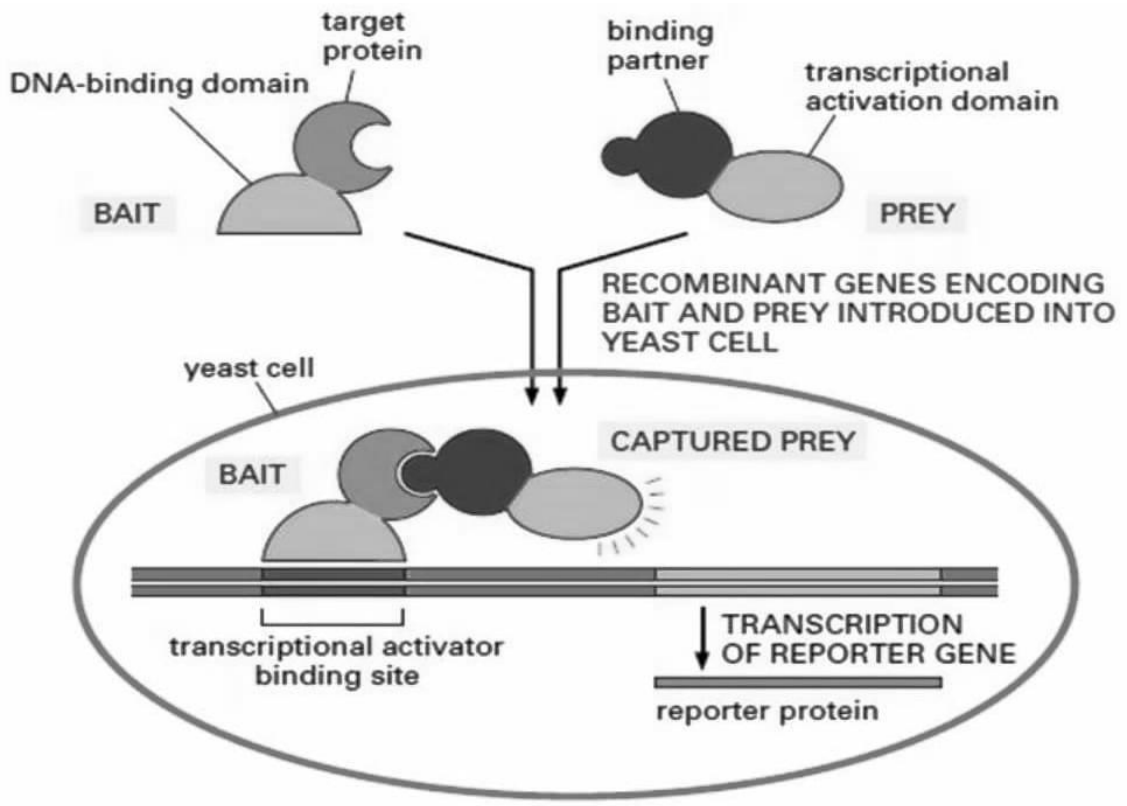
- ✓ Whole Cells/Tissues
- ✓ Peptides/Haptens
- ✓ Recombinant Proteins
- ✓ Membrane Proteins
- ✓ Other *in vivo* Targets

Screening Strategies:

- ✓ Solid-Phase Screening
- ✓ Solution-Sorting Screening
- ✓ Cell-based Screening
- ✓ *In vivo* Screening
- ✓ *Ex vivo* Screening
- ✓ More…

Creative Biolabs *can also license these premade sdAb libraries to our clients who prefer to screen the novel sdAbs themselves!*

2.3 Intrabody Discovery



Creative Biolabs has built up A novel intrabody discovery platform to screen and validate novel single domain antibodies that can bind to intracellular targets specifically within various cellular compartments.

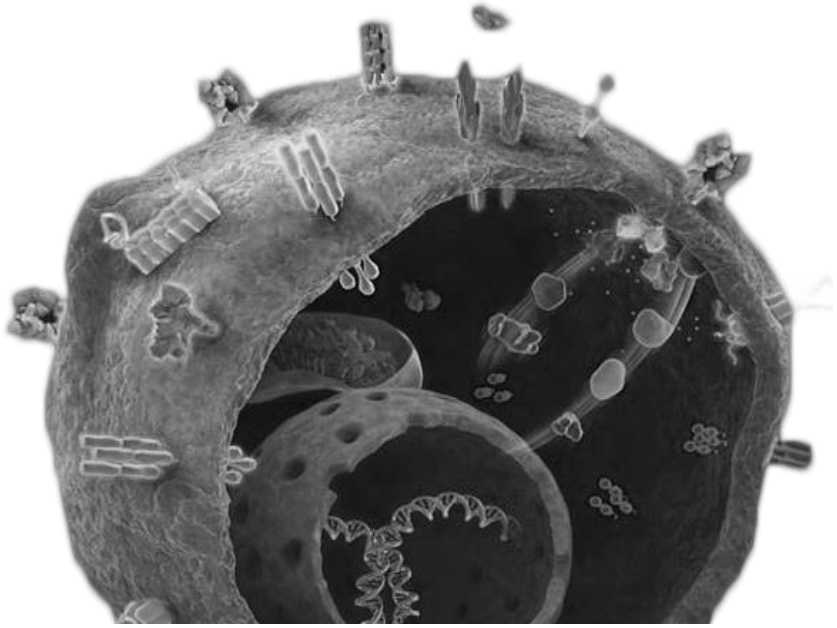
Platform

- Two-Hybrid Detection System
- Advanced Phage Display Platform

Typical Features

- *In vivo* antigen expression.
- A solution to identify binders to proteins or domains, which are unstable *ex vivo*, difficult to purify, or expensive to purchase.
- Can validate specific antibody in either high- or low-throughout manner

2.4 Anti-Membrane Protein sdAb Discovery

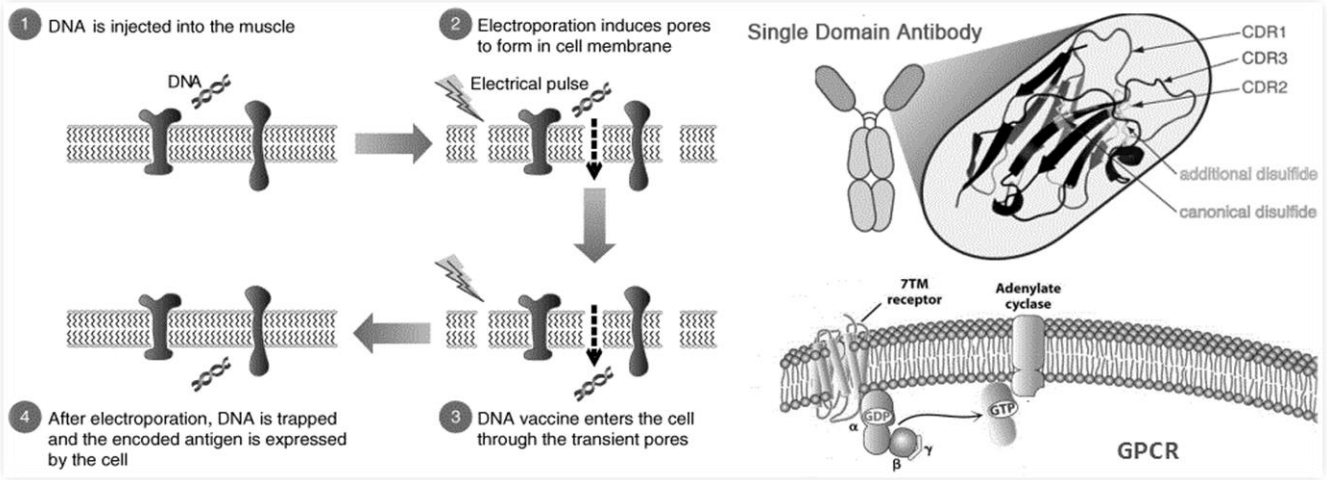


Creative Biolabs has developed a robust and highly effective strategy for generating sdAbs targeting membrane proteins using DNA immunization, whole cell immunization and many other strategies.

Followed by high-throughput screening on cell lines expressing target membrane proteins in native conformation and subsequent analysis by FACS, we have successfully selected a great many potent single domain antibodies at nanomolar or sub-nanomolar level, with desired functionalities.

DISCOVERY

2.4 Anti-Membrane Protein sdAb Discovery *via* DNA Immunization



Improved immunization strategies

- Optimized boost schedule
- Whole cell immunization
- Electroporation
- Other unique methods

Design the best fit immunization procedure

↓

High-quality Immune Library Construction

↓

High-throughput screening on cell lines

↓

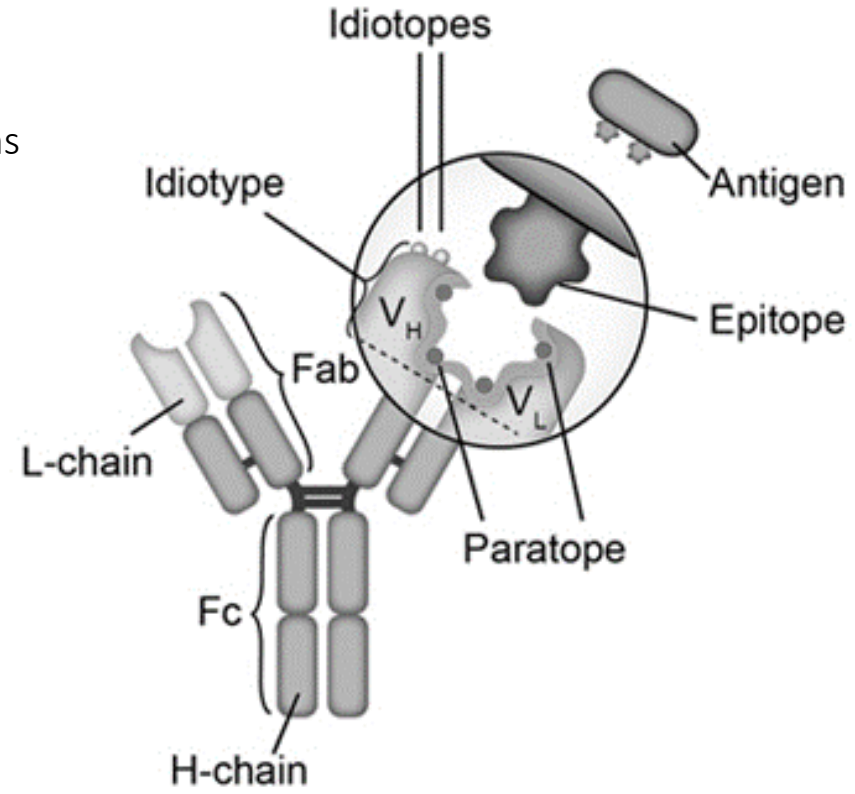
Specific Binders Validation

2.5 Anti-Idiotype sdAb Discovery

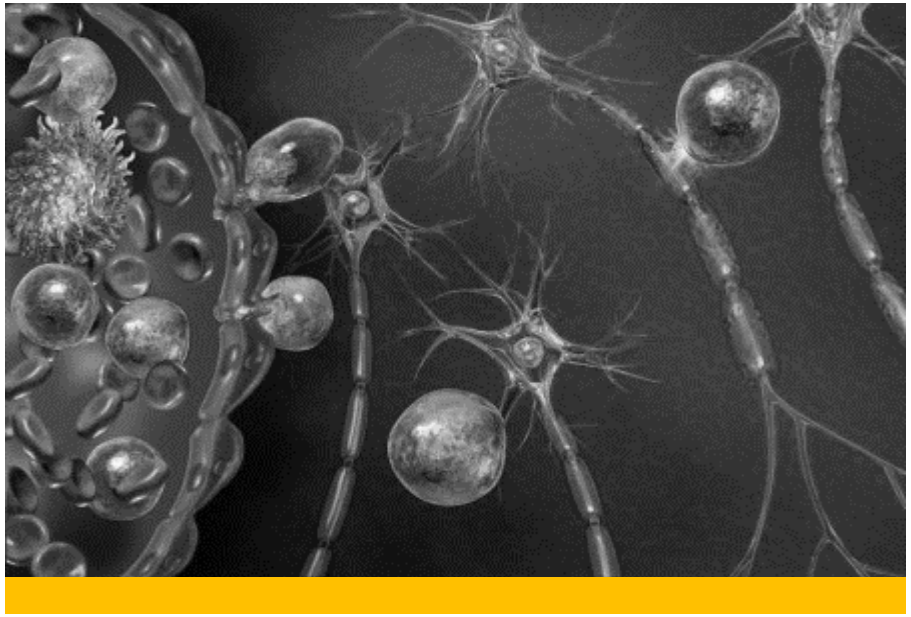
Creative Biolabs offers anti-idiotypic sdAb production service through immunizing camel/llama/alpaca/shark with target antibodies in the forms of whole IgG, scFv, Fab, Fab' or $F(ab')_2$.

Applications

- Antibody drug pharmacokinetic/pharmacodynamics (PK/PD) studies
- Antibody drug immunogenicity (immune response, IR) studies
- Preclinical research of therapeutic antibodies
- Anti-drug antibodies (ADA) for clinical development
- Controls in ligand binding neutralizing assays
- Controls in antibody blocking assays



2.6 Anti-BBB sdAb Discovery



Creative Biolabs offers blood-brain barrier specific antibodies with implications for the development of biologics-based treatment of brain disorders.

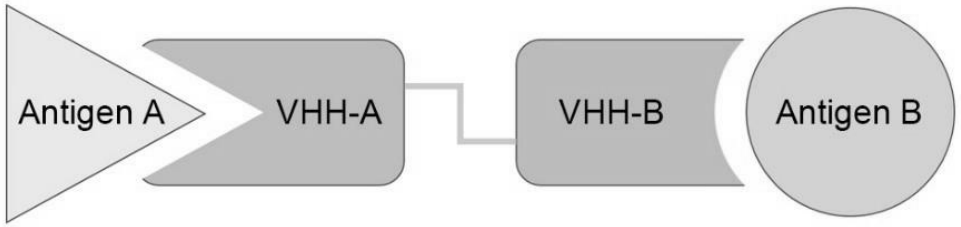
Anti-BBB sdAb can be used as vectors to target drugs or therapeutic peptides into the brain.

Our technology also aims to target endogenous transport systems, including carrier-mediated transporters such as glucose and amino acid carriers, receptor-mediated transcytosis for insulin, transferrin or low-density lipoproteins (LRP1) and the active efflux transporters such as p-glycoprotein.

2.7 Anti-Albumins sdAb Discovery

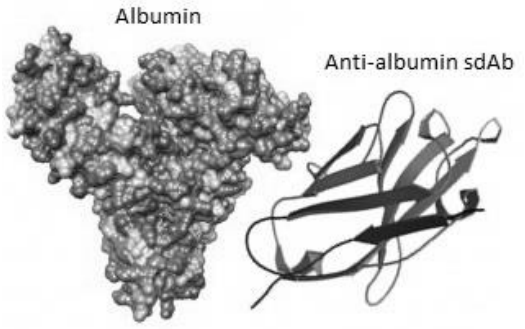
Function

Fusion with an anti-albumin sdAb is a potential option to extend the serum half-life of therapeutic agents. Anti-albumin sdAb will recognize the albumin after properly administration and allow the fused biopharmaceutical agent to be carried around the body, and to take on similar PK parameters with the albumin as well.



Typical Workflow

- Animal immunization (llama/alpaca/camel/shark)
- Immune library construction/Premade library preparation
- Library screening and validation
- Anti-albumin sdAb production/further development



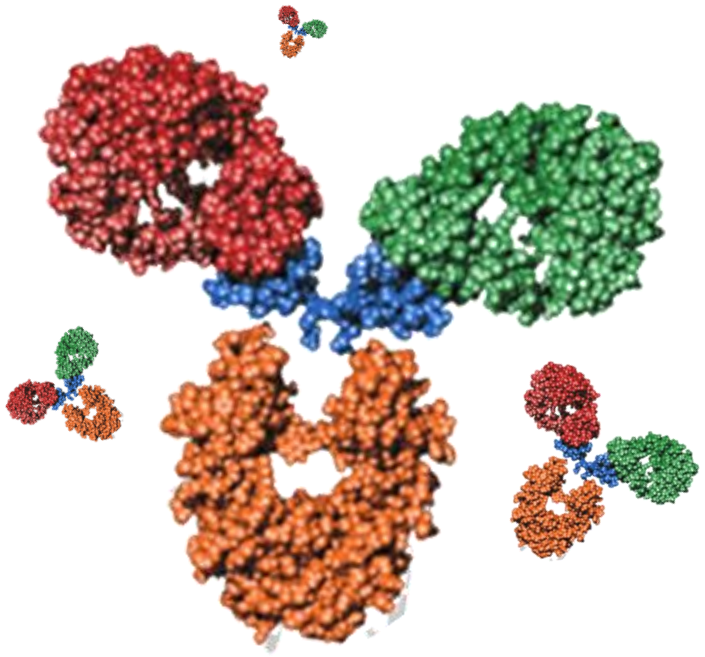
2.8 Custom sdAb Production

We offer custom service to produce custom single domain antibodies. We have a Non-Exclusive License from the following party that allows us to produce single domain antibodies from camelid (llama, camel, and alpaca). We will pay a royalty to this licensor while our customers have full right to own the resulting single domain antibodies. With this license, we can produce single domain antibodies using any method, not limited to phage display antibody library construction and screening, which is also patent-free.

Tech Transfer Department
VIB vzw
Rijvisschestraat 120
9052 Zwijnaarde
Belgium
Website: www.vib.be


03
SINGLE DOMAIN
ANTIBODY DEVELOPMENT
THIRD PART
CREATIVE BIOLABS

DEVELOPMENT



01 *De Novo* sdAb Sequencing

02 sdAb Affinity Maturation

03 sdAb Humanization

04 Bispecific sdAb Engineering

05 sdAb Conjugation

06 sdAb Stability Improvement

07 Antibody Camelization

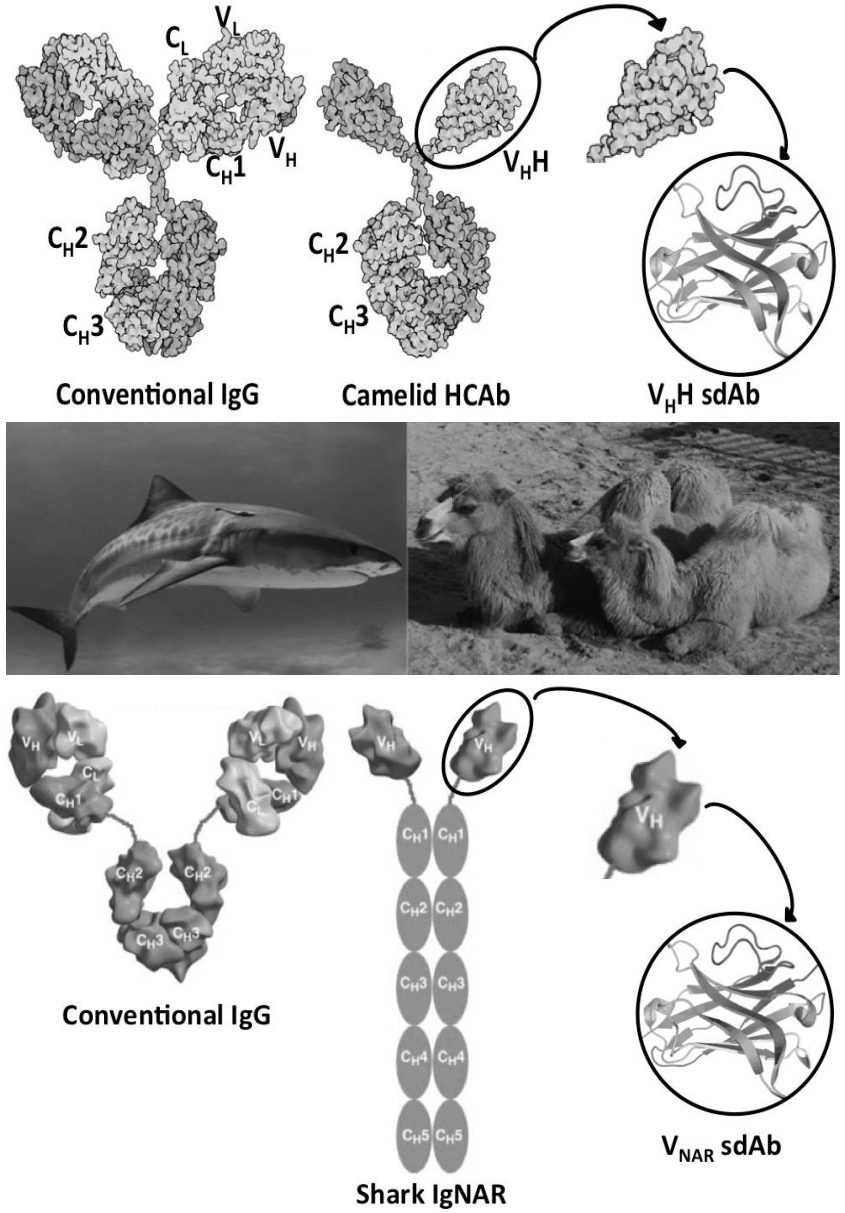
DEVELOPMENT

3.1 *De Novo* sdAb Sequencing

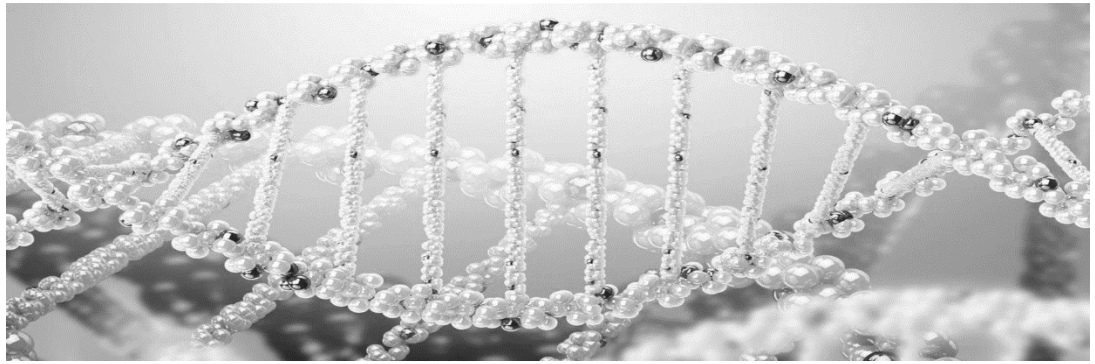
Through the proprietary **Database Assisted Shotgun Sequencing (DASS)** technology, soluble and functional single domain antibody can be ***de novo*** sequenced by subunit with **100% coverage** and dozens of successful cases proving **100% accuracy**.

Specifications

- Sequencing of the V and J and C segments by DASS
- *De novo* sequencing of the CDR3 region
- Sequencing of isobaric amino acids
  - W can be distinguished from GE, AD and SV
  - R can be distinguished from GV
  - Q can be distinguished from K
  - N can be distinguished from GG
  - Q can be distinguished from GA
  - Leucine will be predicted from the germline sequences and the cutting frequency of chymotrypsin.



3.2 sdAb Affinity Maturation



Creative Biolabs has developed a proprietary DNA mutagenesis technique that is able to create a huge number (e.g. 10^{10}) variants of the parental antibody with defined positions mutated.

In combination with our first class phage display antibody library construction and screening technologies, 10-100 fold increase in affinity for parental single domain antibodies of low nM affinity is frequently achieved.

01 A phage display mutant library at a size of 10^{10} is created for each parental sdAb.

02 Validate a large number, e.g. 80, affinity-matured individual mutants using phage ELISA and antibody ELISA.

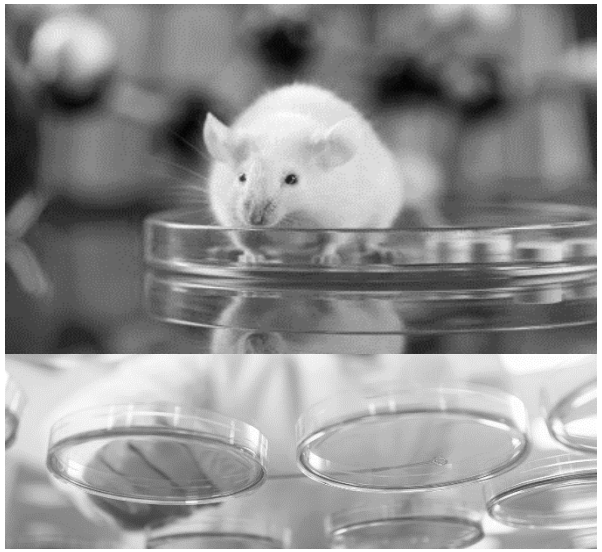
03 Frequently use parental sdAb or antigen to wash away weak mutants.

04 Affinity (e.g. KD) determination on top 5 affinity-matured sdAb mutants.

05 High-throughput biopanning to isolate rare mutants with affinity-increased for 10 or more fold.

06 Get sdAbs of an affinity of 0.1 nM over better.

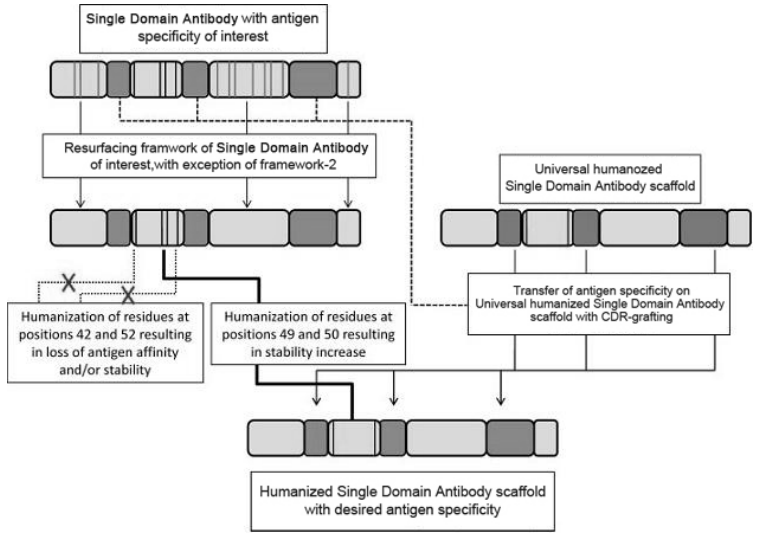
3.3 sdAb Humanization & Human sdAb Discovery



Creative Biolabs has extensive experience in generating human single domain antibodies and humanizing single domain antibodies.

Three approaches to develop human/humanized sdAb

- Screening of the premade synthetic human sdAb library
- Immunizing transgenic mice that harbor human single domain antibody gene repertoires
- sdAb humanization



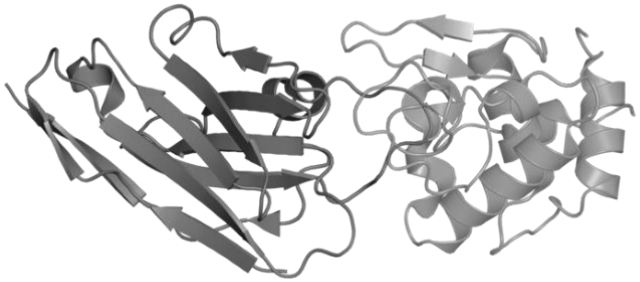
- Employs soluble, stable, well expressed universal humanized single domain antibody scaffolds
- CDR grafting
- Back-mutation

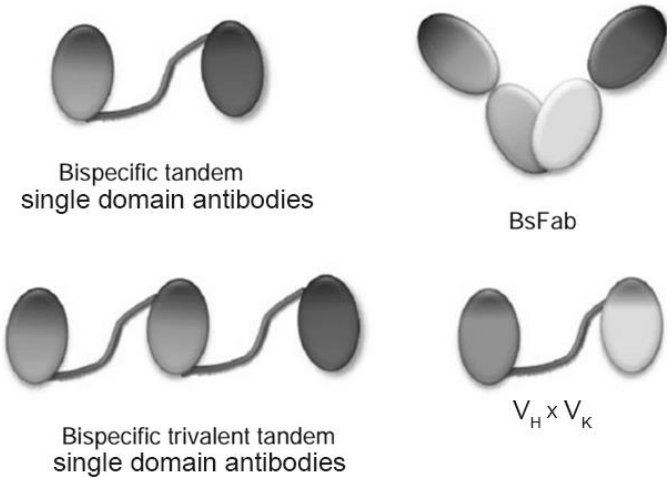
3.4 Bispecific sdAb Engineering

Bispecific antibodies (bsAbs), which are capable of simultaneous binding to two different targets, are considered the most promising solution to increase therapeutic activity by retargeting a large variety of payloads to cancer cells.

Strategy: Link two single domain antibodies *via* a peptidic linker, thereby creating a tandem single domain antibody.

Successfully example: A few bispecific single domain antibodies with neutralization activity obtained using a specially designed linker based on the hinge region of the llama IgG_{2a} isotype





3.5 sdAb Conjugation

Benefits

- Performed by professionals in this field
- Considerable conjugation ratio and scale
- Quick turnaround time and economical expenditure
- High-quality results

Introduction

Bioconjugation is a chemical strategy to form a stable covalent link between two molecules. Conjugated sdAbs have been found significant applications for enhanced stability, sensitive and functionalities in diagnostics and therapeutics.

Applications

- Biological interaction discovery
- Diagnostic applications
- Extend the half-life of single domain antibody

3.5 sdAb Conjugation

01 sdAb Biotinylation Service

02 sdAb-Enzyme Conjugation Service

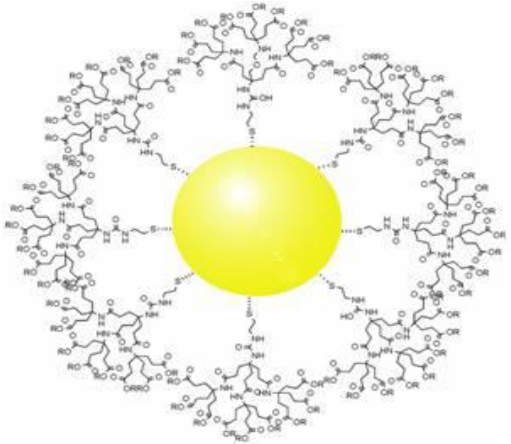
03 sdAb-Fluorophore Conjugation Service

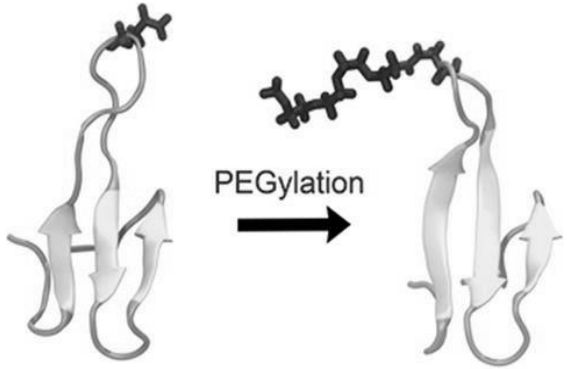
04 sdAb-Gold Nanoparticle Labeling Service

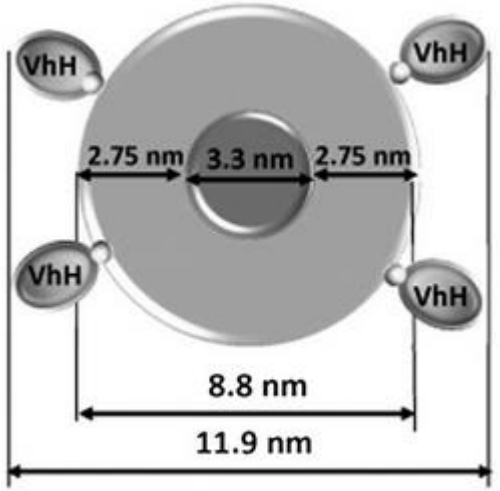
05 sdAb PEGylation Service

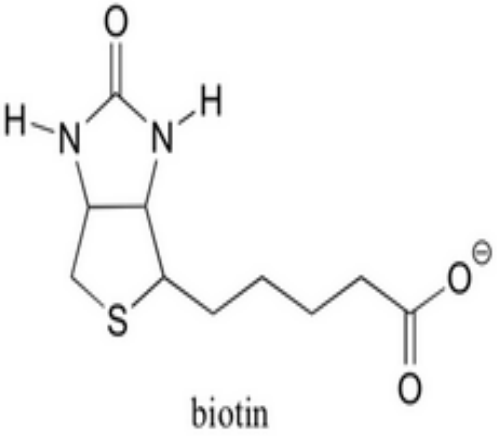
06 sdAb-Polystyrene Beads Labeling Service

07 sdAb-Quantum Dots Conjugation Service

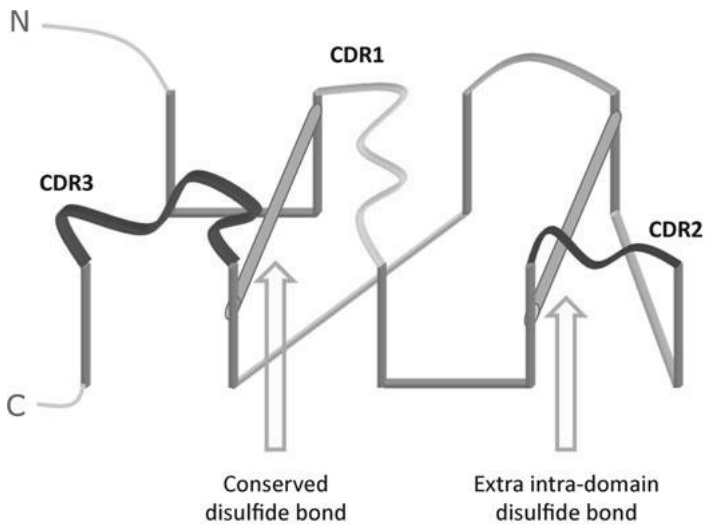








3.6 sdAb Stability Improvement

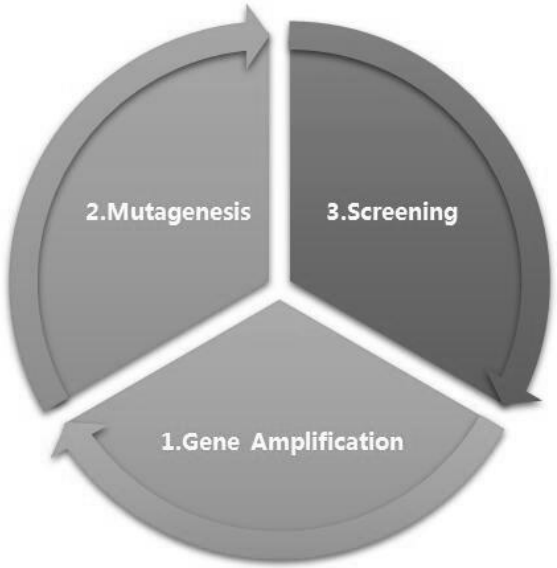


In vitro sdAb stability

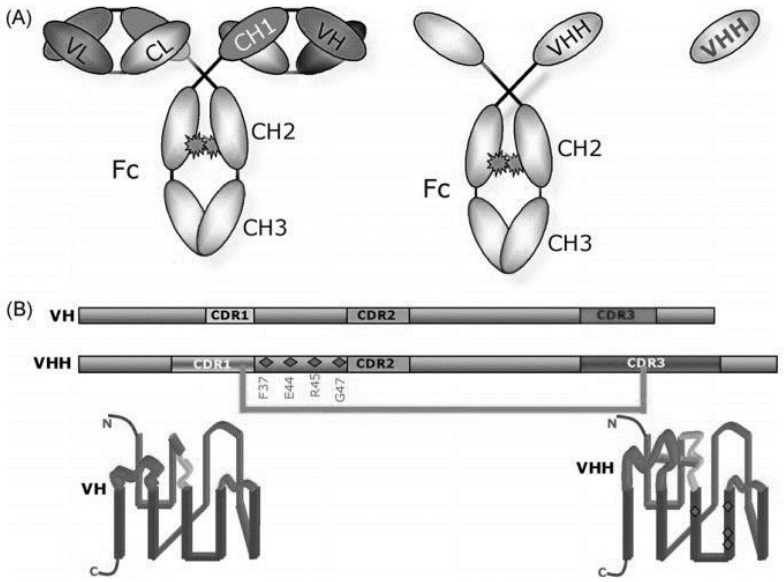
- Physical stability (thermodynamic stability)
- Chemical stability (proteolytic stability)

Approaches

- Two amino acid substitutions within the framework to form an additional intra-domain disulfide bond.
- CDR is grafted onto the stable framework.



3.7 Antibody Camelization



Creative Biolabs provides service of *in silico* design of camlized human antibodies.

- We select the single domain antibody framework with the best homology to human VH backbone, perform CDR grafting *in silico*, and then run computer based antibody modeling to do back mutations.
- Combined with construction and screening of a custom single domain antibody library, camelized (human) antibody sequences of the best affinity are generated.

HuSdL® Human Single Domain Antibody Library → Camelized human antibodies

The single service provider in the world!

04

SELECTED REFERENCES

FOURTH PART

REFERENCE

We conducted novel sdAb discovery and development projects for following customers with excellent results, who are willing to be our references.

Dr. Emmanuelle VIGNE

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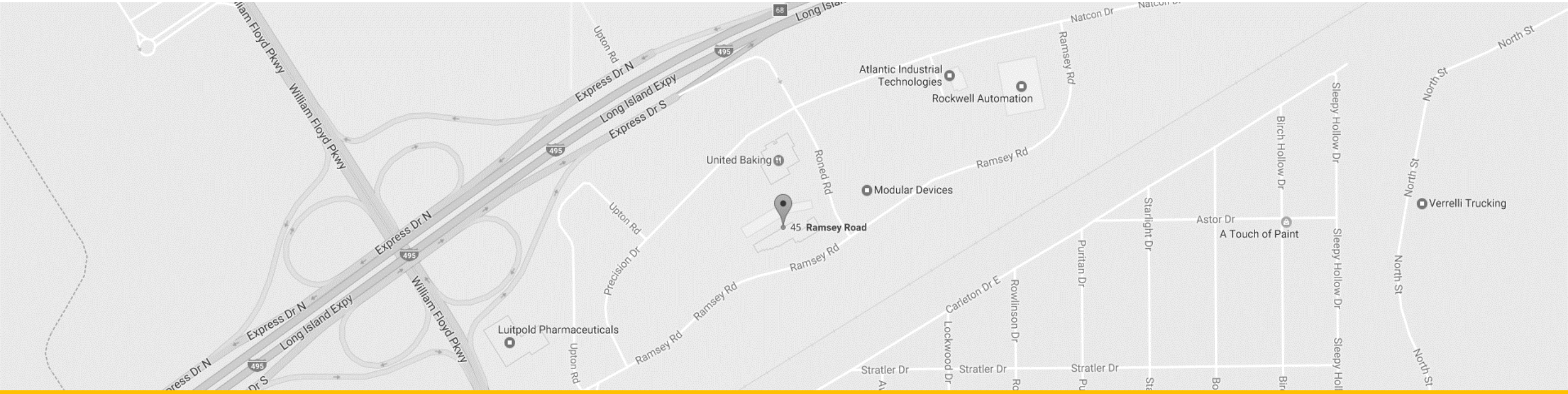
CONTACT US



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Web: www.creative-biolabs.com/sdab

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