CUSTOM SERVICES

Trusted Manufacturing and Validation

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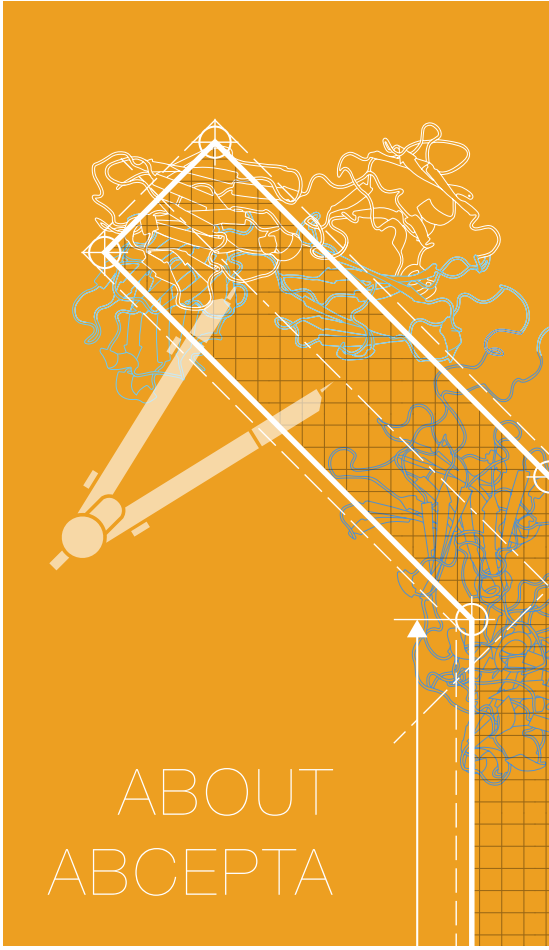


ABOUT ABCEPTA

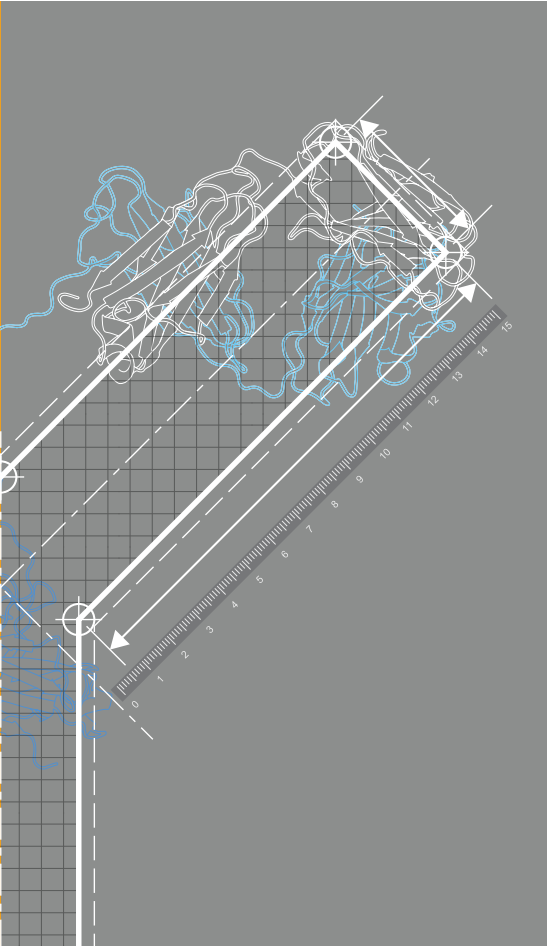
CONTENT

Abcepta is a leading manufacturer of primary antibodies, with a core team of experts working together for more than 20 years in bioreagent development and service.

Deep and practical understanding of the production and validation process for antibodies, peptides, and recombinant proteins.

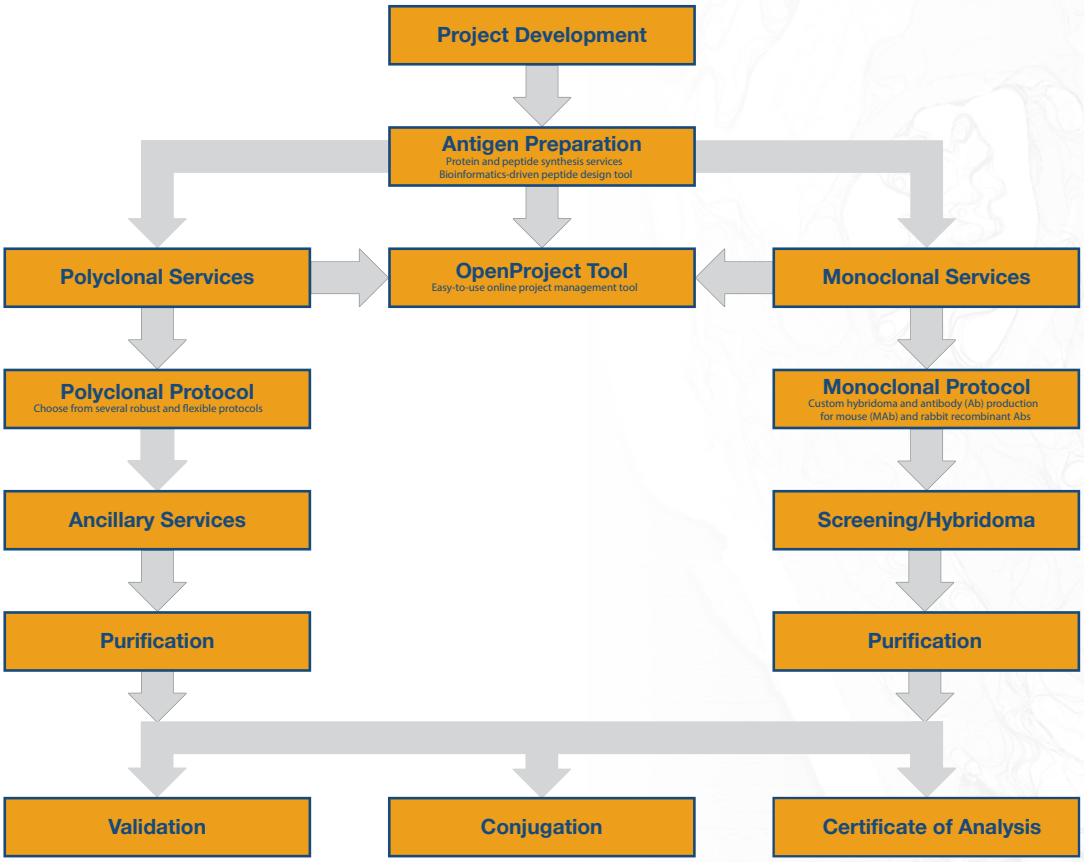
World-class, credentialed facility and highly trained staff who rigorously test our deliverables in-process and post-production.

Stringent internal monitoring with abundant client communication to assure that we earn the trust of those who choose to work with us.



Antibody Production Workflow

Abcepta scientists have developed more than 25,000 monoclonal and polyclonal antibodies for commercial, academic, and governmental labs worldwide. Through our Custom Antibody Production Service, clients access proprietary resources and technical knowledge optimized from extensive experience in antigen design, peptide conjugation, immunization, and purification.



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Timeline & Options

Abcepta offers comprehensive custom antibody services. Capabilities include peptide antigen design (including site-specific modified versions such as phosphopeptides), synthesis, serum collection and hybridoma fusions, and purification. Customizations include cleavage, lyophilization, custom vialing and validation by Western Blot, IHC, IF and IP.

POLYCLONAL ANTIBODY — 5-12 Weeks

Anti-pan peptide antibody
customer provides peptide: 1-2 mg

Anti-pan peptide antibody
Abcepta generates peptide: 15-20-mer, 5-10 mg

Anti-phospho-peptide antibody
15-20-mer, 5-10 mg

Anti-protein antibody
customer provides purified protein: ~5 mg

Immunization of two rabbits
(Other animals available)

Perform test bleeds, ELISA titer tests

Purification of serum by antigen affinity or protein-A/G purification

MONOCLONAL ANTIBODY — 4-5 Months

Anti-pan peptide antibody
customer provides peptide: ~4mg

Anti-pan peptide antibody
Abcepta generates peptide: 15-20-mer, 5-10 mg

Anti-phospho-peptide antibody
11-15mer, 5 mg

Anti-protein antibody
customer provides purified protein: ~4mg

Immunization of two mice, fusion, screening, subcloning and initial characterization

Up to 3 monoclones selected and their supernatants tested by ELISA to confirm immunogen reactivity.

Antibody purification from hybridoma culture by antigen affinity or protein-A/G purification

Antibody conjugation with enzymes, fluorochromes, affinity ligands and solid surface conjugation is also available on request.

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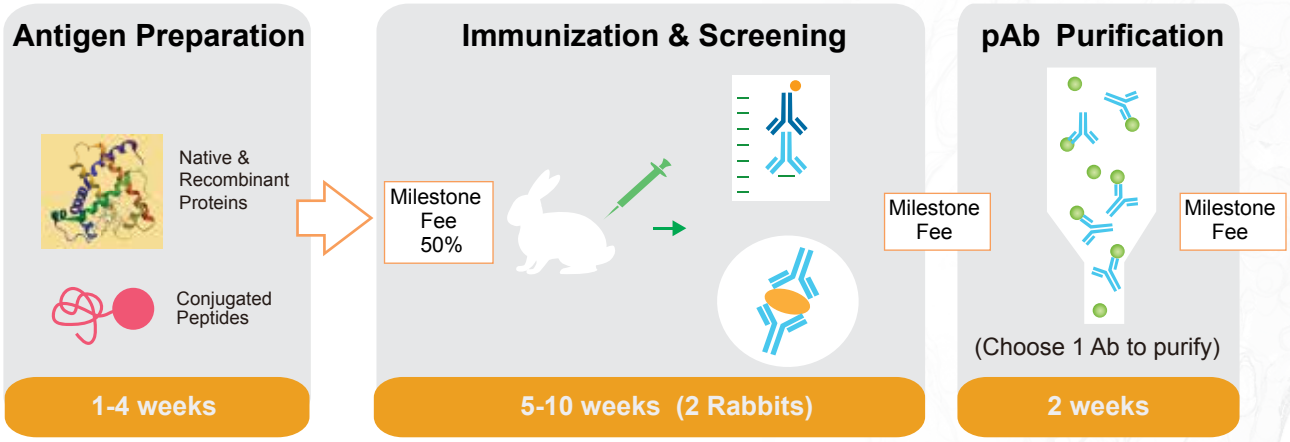
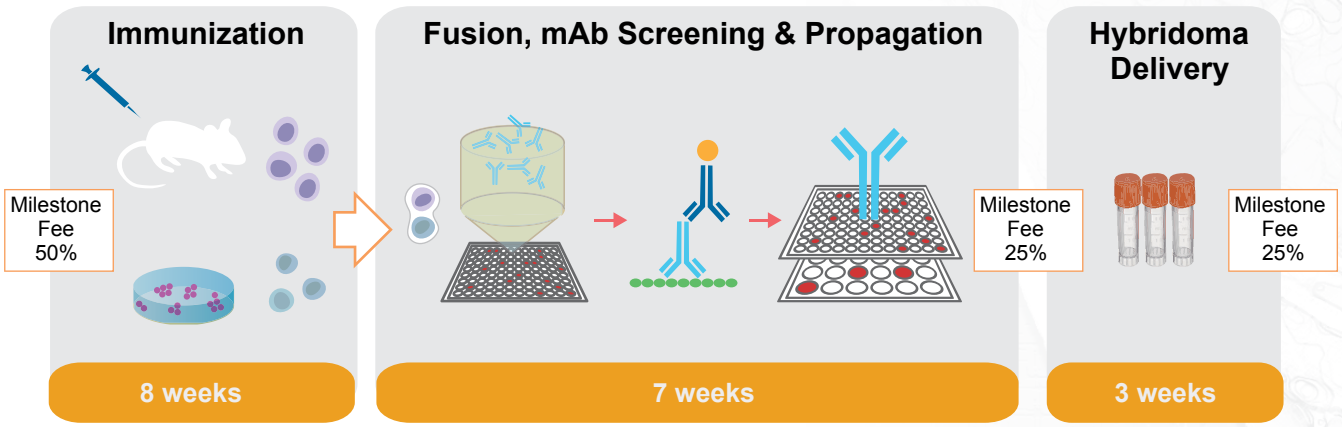
Milestones & Guarantee

- Free Consultation and Experimental Design
- Strict Confidentiality
- Flexible Customization
- Optimized antigen preparation, immunization, screening, and purification
- Rigorous Quality Control
- Short Turn Around Time
- Competitive Price

Polyclonal Antibody Custom Service



Monoclonal Antibody Custom Service



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Classic Immunization: ~10 weeks

Subject	New Zealand Rabbits for polyclonal antibody generation.
Adjuvants	Use of conventional and/or proprietary adjuvants (e.g Antibody Express).
Immunogen Options	Synthesize one peptide (12-22aa, purity>85%). Conjugate the peptide to carrier protein (KLH, BSA or OVA). 50-100 µg immunogen is used per immunization.
	Customer provides antigen protein. Protein may be checked by OD, SDS-PAGE or MS.
	If antigen protein is IgG and requires fragmentation, additional information may be requested and discussed with customer.
	Customer may provide expression vector to express and purify the antigen protein.
	Customer may provide gene and protein information, to clone the gene and construct the expression vector (for fusion protein) and express and purify the antigen protein.

Schedule

Week 0	Bleed 10 ml (yields 2-3 ml pre–immune serum). Immunize with 200 µg/rabbit antigen in adjuvant.
Week 1	Prepare materials for second immunization.
Week 2	Immunize with 100 µg/rabbit antigen in adjuvant.
Week 3	Prepare materials for third immunization.
Week 4	Immunize with 100 µg/rabbit antigen in adjuvant.
Week 5	Test bleed 10-20 ml/rabbit. Specific antibody screening via ELISA performed against antigen. Immunize with 100 µg/rabbit antigen in PBS.
Week 6	1st Production bleed 20-30 ml if test positive. Immunize with 100 µg/rabbit antigen in PBS.
Week 7	2nd Production bleed 20-30 ml. Immunize with 100 µg/rabbit antigen in PBS. ELISA test again if previous tests were negative. If negative, consult with client regarding continuation of project.
Week 8	3rd Production bleed 20-30 ml. Immunize with 100 µg/rabbit antigen in PBS.
Week 9	4th Production bleed 20-30 ml. Immunize with 100 µg/rabbit antigen in PBS.
Week 10	Terminating bleed 30-50 ml/rabbit. The antibody is purified by an Antigen Specific Affinity purification. Average yield of purified Ig fraction is 100-150 mgs.

Speedy Immunization: ~5 weeks

* Reactogenicity analysis may exclude eligibility. Inquire for details

Antibody Express™	An adjuvant with unique characteristics to accelerate timelines
	.
Quicker immune response	Requires just two immunizations generating immune response within 3 weeks. .
High Titer	Antibodies with ELISA titers 1:10,000~1:10,000,000 elicited by week 5.
Antigen-sparing effects	Permits lower dosing of antigen (typically 5~20 ug per injection)
No destruction of native antigen conformation	Facilitates generation of monoclonal antibodies against conformational epitopes.
Non-protein composition	Eliminates contamination from epitope competition compared to adjuvants containing proteins.
No emulsification required	Formulated as a ready-to-use consistent solution freshly prepared prior to immunization.
No foot-pad or intra-spleen immunization	Antibody Express™ adjuvant safely applied through intra-muscular injection.

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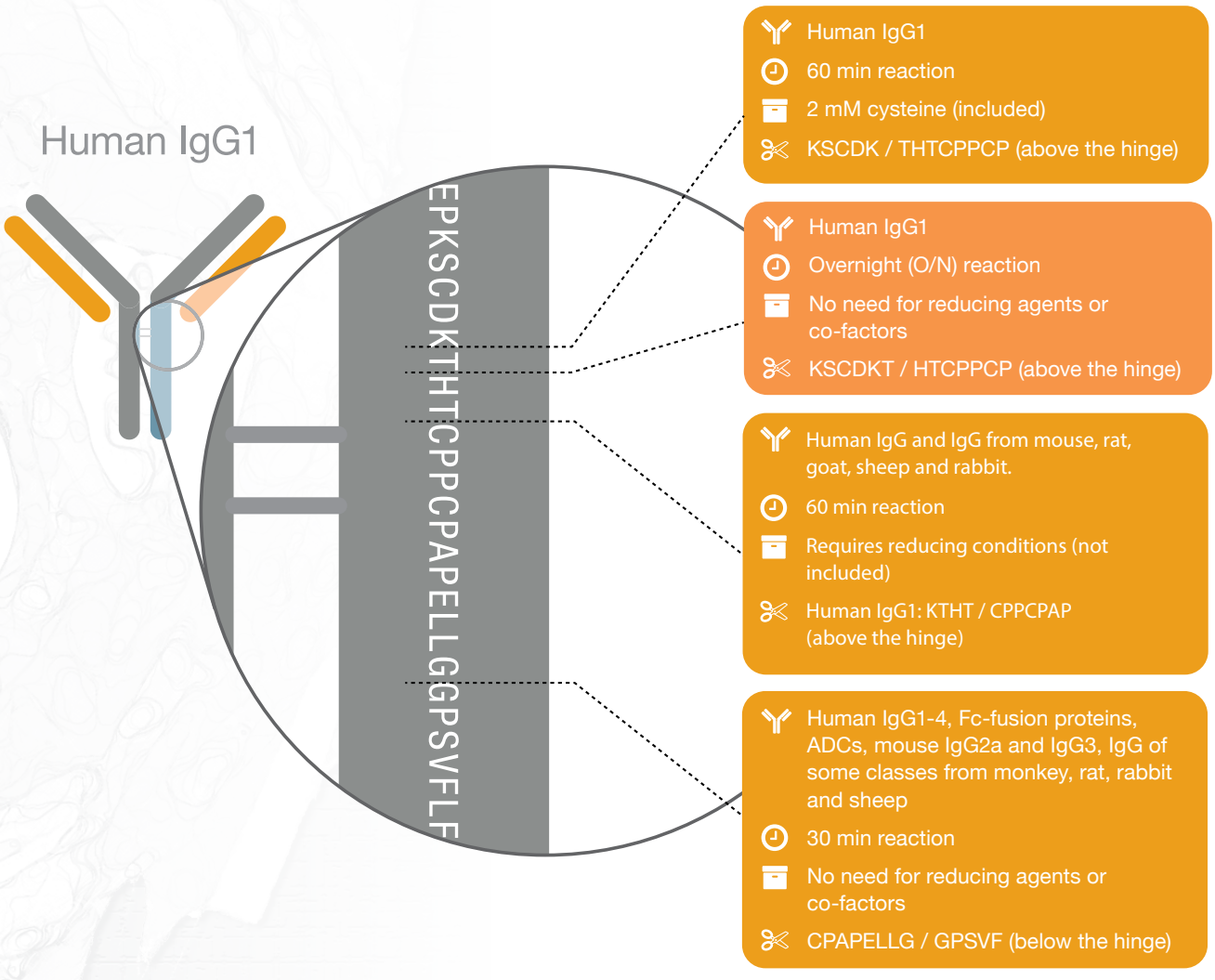
Abcepta IgG Proteases

Abcepta employs four unique enzymes for preparation of antigen-specific formats of Fab fragments. These proteolytic enzymes digest antibodies from several species and subclasses into selectable subunits.

FabriCut Enzyme Panel



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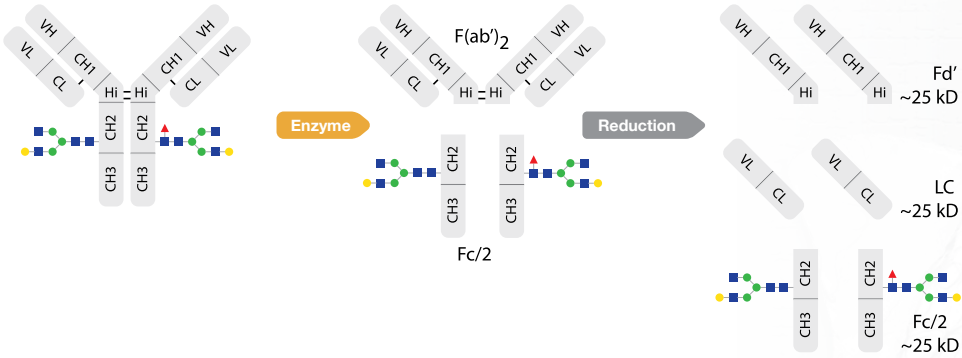
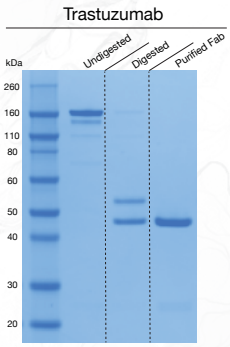
Fab Production

Enzymatic digestion of IgG results in F(ab')2 and Fc/2 fragments that can be reduced to antibody subunits.





Abcepta FabriCut proteases are a group of proteolytic enzymes that digest antibodies from several species and subclasses into subunits. Ideal for development of antigens for Anti-drug antibody (ADA) assays.

Trastuzumab digested by immobilized FabriCut. Pure Fab fragments were obtained in a high yield from all three subclasses into subunits.

Enzyme	FabriCut-1	FabriCut-2	FabriCut-3	FabriCut-4	FabriCut-1.1
IgG species and subclasses	Human IgG1-4, mouse IgG2a and IgG3, some classes of rat, monkey, rabbit and sheep	Human IgG1	Human IgG1	Human IgG, mouse, rat, goat, sheep and rabbit	Human IgG1-4, Mouse IgG2a and IgG3, some classes of monkey, rabbit and sheep
Digestion site (human IgG1)	LLG / GPS	DKT / HTC	CDK / THT	THT / CPP	LLG / GPS
Above / below hinge (human IgG1)	Below	Above	Above	Above	Below
Reaction requirements	Physiological buffers	Physiological buffers	2 mM cysteine	Reducing conditions	Physiological buffers
Reaction time	30 min	O/N	1 h	1 h	2 h
pH	5.5 - 8	6 - 8	8	6.5 - 8	5.5 - 8

Custom Peptides

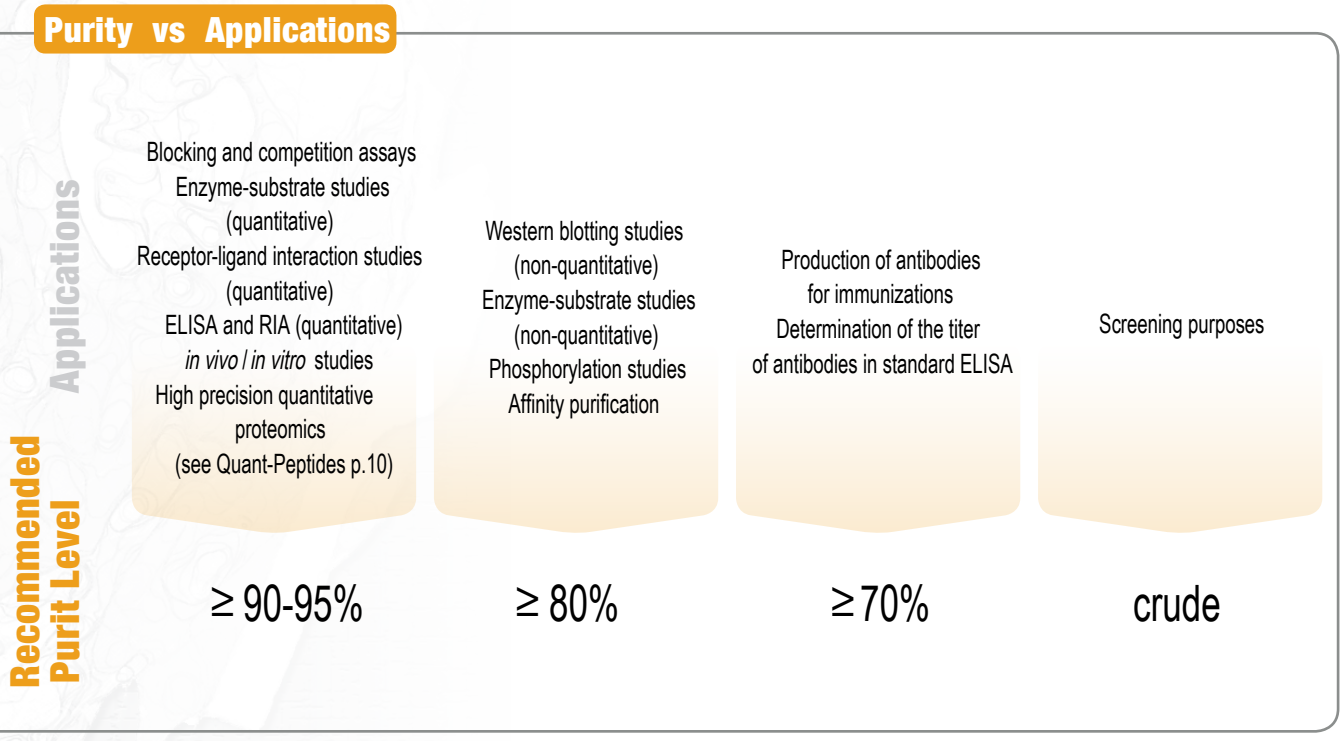
Abcepta peptide chemists have synthesized >20,000 peptides, leveraging > 20 years expertise to deliver to our clients custom peptide solutions meeting stringent quality control standards for identity and purity. In addition to rapid routine synthesis, Abcepta applies the latest technical innovations to execute challenging projects, such as hydrophobic peptides, long peptides (>100 amino acids), and peptides with structural complexity.

KEY FEATURES

Peptide length*	**2-140 amino acids**
Modifications	**Over 400 modifications available**
Scale	**1 mg–1 g**
Purity	**Crude–98%**
QC	**MALDI MS and HPLC**
Delivery time	**2–3 weeks**

* Please inquire about shorter or longer peptide lengths

Purity vs Applications



Peptide Modifications

Peptide modification feasibility is dependent on the peptide sequence, properties and desired location. Hence, our technical team will review each request case by case. Modifications can be of the following types: N-terminal; C-terminal, Structural; Conjugation; and Unnatural Amino Acid (UAADs).

Unnatural Amino Acid (UAADs) can be exploited to enhance the stability or functionality of a therapeutic target, and can be site specifically incorporated into your synthetic custom peptides. Examples include post-translational modifications such as the carboxylation of glutamate (forming the UAA-gamma-carboxy glutamate), and hydroxylation of proline (forming the UAA-hydroxyproline).

Modification Classification

N-Terminal	C-Terminal	Structural	Conjugation	UAAD	Other
Acetylation (caps charge)	Amidation (caps charge)	Cyclization	DOTA	Alkyne	Pegylations
Biotinylation	Biotinylation	Disulfide formation	BSA	Azide	Peptidomimetics
Fluorescent-dye	Fluorescent-dye	Hydrocarbon stapling	Prenylation	Glycosylated	
Formylation	Aldehydes (formylation)	Lactamation	Farnesylation	Heavy Isotope	
Myristoylation	Alcohol group	MAP formations	Geranylation	Methylations	
Succinylation	Hydrazide	Thiolactonation	Peptide-oligonucleotide	Phosphorylation	
Bromoacetylation	Esterification/thiol esters			Sulfonation	
DOTA conjugated	N-alkyl amidation				
	Ketones (CMK, FMK)				

Modifications vs Applications

Applications	Modifications
Immunology-related studies	Biotinylation Formylation Pegylation MAPS KLH/BSA conjugation
Protease activity /inhibitions	Alkylamidation Thiolation FRET-based assays
Protein folding and aggregation studies	Glycosylation Cysteamidation
Protein-protein interactions, membrane-transport/ function, signal transduction etc.	Myristoylation Phosphorylation Peptidomimetics Sulfonation
Drug delivery, cellular uptake, PK properties, bioactivity, conjugations etc.	Prenylation Farnesylation Geranylation Methylation Cyclization Br-acetylation Succinylation Stapling

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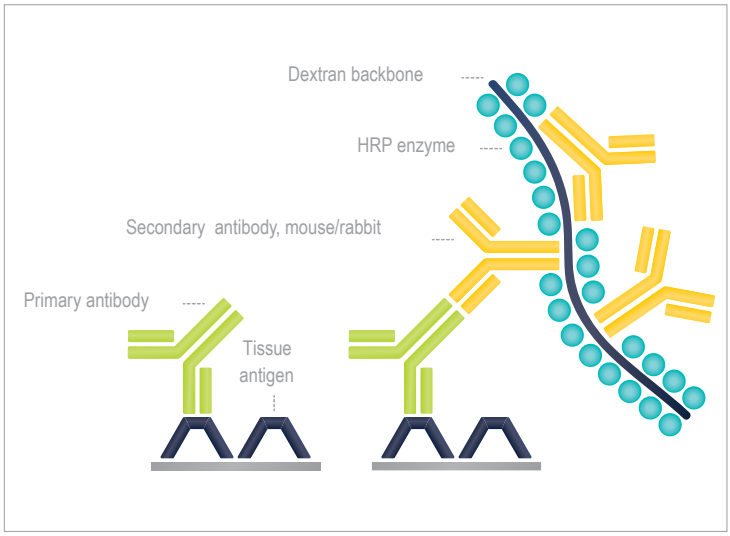
Automated IHC

Polymer-Based Immunohistochemistry (IHC)
To overcome limitations associated with avidin-biotin systems, Abcepta offers a detection system with higher sensitivity and specificity, employing a polymer-based IHC technique.

Up to 70 enzyme (Ez) molecules and 10 primary antibodies (Abs) are conjugated to a polymeric backbone. This detection construct permits the entire IHC staining procedure to be accomplished in a single rapid step.



Exceed pathologists' TAT expectations for complete case delivery with Abcepta's automated IHC staining system. A single high-throughput system completes 5 cases (30 slides) in 2.5 hours; multiple instruments further accelerate data output.

HEMATOPATHOLOGY PANELS				
Ave. TAT	Panel A 2:33:06	Panel B 2:36:07	Panel C 2:28:39	Panel D 2:28:39
	BCL2	BCL2	BCL2	BCL2
	BCL6	BCL6	CD3	BCL6
	CD3	CD3	CD5	CD3
	CD5	CD5	CD10	CD10
	CD10	CD10	CD20	CD20
	CD20	CD20	CD21	CD45
	CD21	CD21	CD23	Ki67
	CD23	CD23	Cyclin D1	TdT
	Cyclin D1	Cyclin D1	Kappa	
	Kappa	Ki67	Lambda	
	Lambda			

NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Non-Hodgkin's Lymphomas. Version 4.2014.

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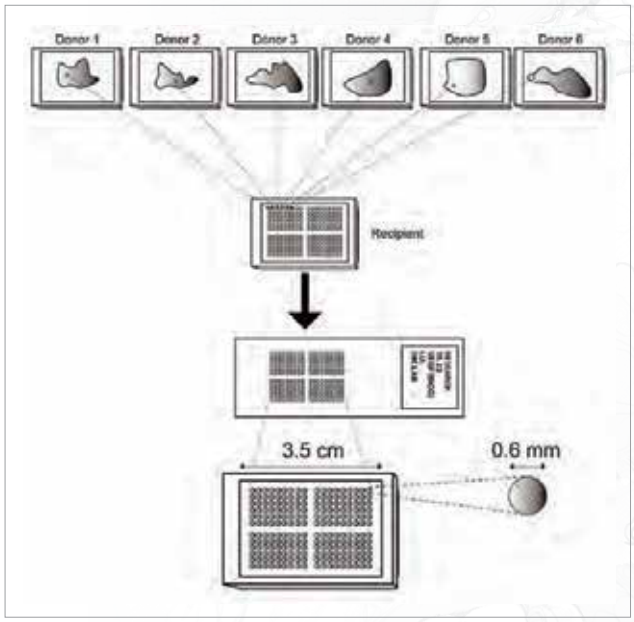
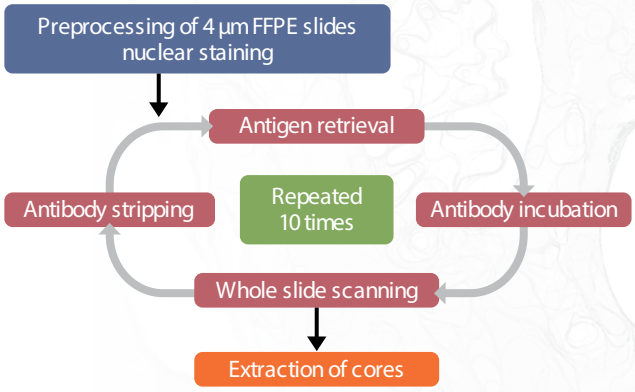
Tissue Microarray

Abcepta Tissue Microarray Analysis (TMA)
Cylindrical cores are obtained from up to 1,000 individual formalin-fixed, paraffin-embedded blocks. These are transferred to a recipient TMS block, which is sectioned up to 300 times. All resulting TMA slides present the same tissues in the same coordinate positions. The individual slides can be used for a variety of analyses, saving labor and reagent costs while maintaining uniformity of assay. Typically a minimum of three 0.6 mm cores are used for each case.



Overview of multiplex IHC using Abcepta TMA
After preprocessing, hematoxylin staining for identification of nuclei is followed by up to 10 IHC iterations, including antigen retrieval, antibody incubation, whole slide scanning, and antibody stripping. IHC markers are customizable to client specifications.



Advantages of Abcepta TMA
IHC is performed on a large number of patient samples in an efficient and cost-effective manner.

Hundreds of cores from several hundred patients can be included in a single glass slide for simultaneous assay.

Significantly more tissue is conserved compared to serial sectioning of tissue blocks.

Abcepta TMAs apply to all tissue types, including decalcified bone and core biopsies.

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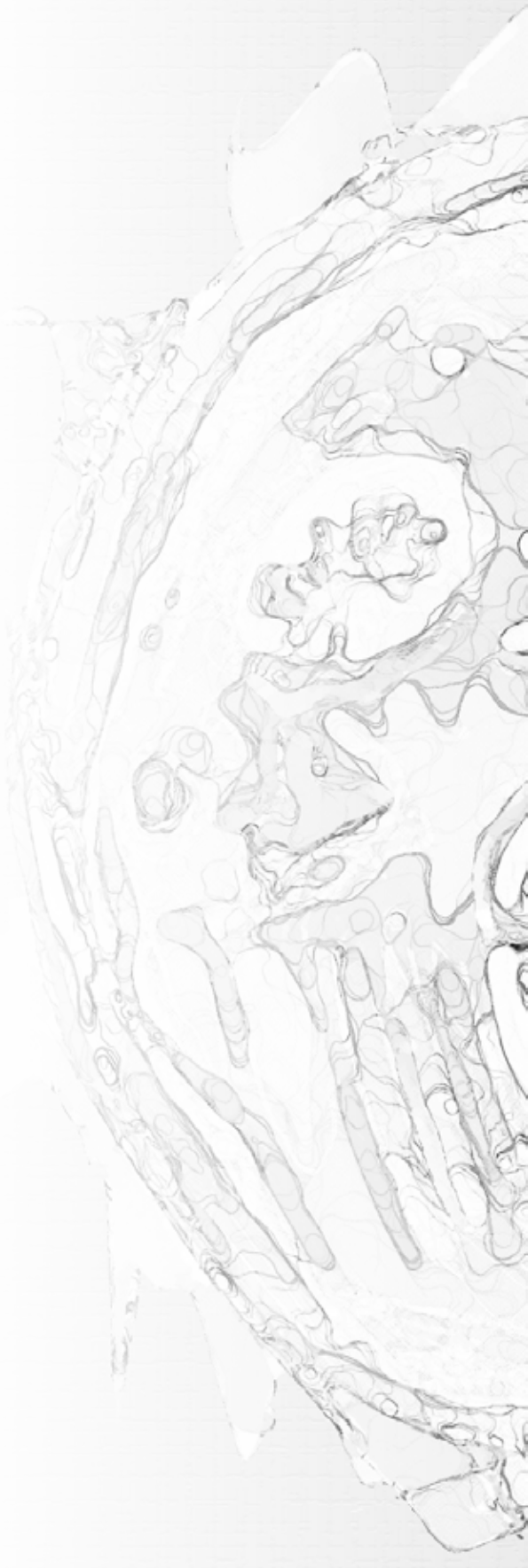

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