Innovative Peptide Solutions

Custom Peptide Services

- Custom & Specialty Peptides
- Clinical Peptides
- Peptide Libraries
- Peptide Pools
- Peptide Arrays
- Peptidomimetic & Organic Synthesis
History

JPT Peptide Technologies is a service provider located in Berlin, Germany that has achieved worldwide credibility for its commitment to rigorous quality standards and a reputation for developing and implementing innovative peptide-based services and research tools for various applications.

Together with its US-subsidiary JPT serves its clientele in the pharmaceutical and biotechnology industries as well as researchers in universities, governmental and non-profit organizations.

Technology & Application

Over the past decade JPT has developed a portfolio of proprietary technologies as well as innovative products and services that have helped to advance the development of new immunotherapies, proteomics and drug discovery.

Quality Assurance

JPT is DIN EN ISO 9001:2015 certified and GCLP audited.

JPT’s key technologies are:

Custom & Specialty Peptides

We are peptide experts with a track record of more than 20 years and offer the largest variety of peptide chemistries, formats and modifications.

PepMix™

Defined antigen spanning peptide pools to stimulate CD4+ and CD8+ T-cells.

PepTrack™

Peptide libraries of individual peptides offering various specifications and optimization for different types of assays.

Clinical Peptides

Custom peptides produced for the stringent requirements of cellular therapy as well as vaccine and drug development.

PepStar™

Peptide microarray platform for antibody epitope discovery, monitoring of humoral immune responses, protein-protein interactions and enzyme profiling.

SPOT

High-throughput peptide synthesis for T-cell epitope discovery, neo epitope qualification and peptide lead discovery.

SpikeTides™

Light and stable isotope-labeled or quantified peptides for mass spectrometry based proteomics assays.

SpikeMix™

Stable isotope-labeled peptide (SIL) pools used as peptide standards in mass spectrometry based assays.
04 / Custom & Specialty Peptides
  04 / Custom Peptides
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  08 / Clinical Peptides

10 / Peptide Libraries & Peptide Pools
  12 / PepTrack™ Peptide Libraries
  14 / PepMix™ Peptide Pools for T-cell Assays
  16 / SpikeTides™ Isotope-Labeled Peptides
  18 / SpikeMix™ Peptide Pools & Sets
  19 / BioTides™ Small Scale Biotinylated Peptides

20 / Peptide Arrays & Peptide ELISA
  21 / Microarray & ELISA Assay Service
  22 / PepStar™ Customized Peptide Microarrays
  23 / RepliTope™ Catalog Peptide Microarrays
  24 / PepSpots™ Peptide Arrays on Membranes
  25 / Peptide ELISA
Choose JPT for all peptide needs!

We are the Peptide Experts!
JPT has a substantial track record providing custom peptides, peptidomimetics, and proteins to the global scientific community. We produce peptides in a range of purities, at different quantities, with and without modifications.

We have 99% Success Rate!
We select and optimize our synthesis and purification methods and techniques for every synthesis. Therefore, we have a very high success rate (over 99%). We go the extra mile to get your peptides done!

Our Service is the Best!
We offer quick and personal consultation with experienced scientists and help you with the selection of peptide specifications, provide tips for storage, solvents and more. Take advantage of our rush order service for urgent projects.

Our Quality Controls
JPT provides the most comprehensive portfolio of state-of-the-art analytical quality control procedures for peptides such as HPLC-MS, UPLC-HR-MS, MALDI-MS, ESI-TOF-MS, AAA, NMR, content determination and many more.

Certified Quality Standards
For more than a decade JPT’s operations run under a quality management system based on the latest ISO 9001 standards. We fulfill highest health and environmental standards and invite our customers to inspect our facilities.

Proprietary Technologies by JPT
We developed several proprietary technologies that enable a wide range of applications and uncomparable prices. In addition, we offer the widest product portfolio of peptide-related products in the market.
Let’s talk about:

**Peptide Purity**
Even small impurities may create huge problems in certain assays. However, the impact of such by-products depends strongly on your specific application. Therefore, it is essential to choose the appropriate purity level.

Tell us about your application to select the best specification for your peptides!

**Solubility**
Ever had the problem to dissolve a peptide or having limited solvent choices? How about using our help to predict the solubility of a peptide in advance and selecting the peptide sequences that work best? Or let us do a complete solubility test to find the best solvent?

Talk to us!

**Value**
We work hard to meet your budget. Our patented technologies enable cost effective and tailored quotes for your specific application!

**Delivery Time**
We appreciate that your time is precious and work hard to keep agreed timelines. Any delays will be communicated promptly.

**Stability & Storage**
Most peptides are stable for years, if stored correctly. However, about 20% of peptides have a limited shelf stability! But how do you recognize and handle potentially unstable peptides? We have the tools and the long term data to do so.

Ask us!

**Peptide Content & Net Weight**
Peptide purity is measured by HPLC. In addition to side products analyzed by HPLC, peptides contain non-peptidic components. The quantification of those is essential to accurately adjust peptide concentration.

Ask us to get fast and inexpensive access to the real peptide content.

**Difficult Peptides**
Most peptides are assembled by automated synthesis and purification. However, many peptides are difficult to isolate due to their unique physicochemical properties. Our goal is to deliver every peptide and we never stop if an initial synthesis fails.

Ask us to learn about our strategies for difficult peptides.
Custom & Specialty Peptides

Custom Peptides

We do not just synthesize peptides. JPT and its staff have considerable knowledge in providing high quality peptides for all applications. We are able to meet the most challenging synthesis projects because we are the peptide experts for more than 20 years!

Our Service Includes
- Consultation with experienced scientists
- Help with peptide specifications
- Optimized peptide synthesis methods and protocols
- Reliable quality control using state-of-the-art techniques
- Competitive prices

Custom Peptide Scale
Our minimum order for custom peptides is 1mg and we are able to deliver up to several grams. For peptide libraries with smaller amounts, refer to SpikeTides™ and PepTrack™.

Aliquoting & Pooling
Ask for our aliquoting and validated pooling services!

Custom Peptide Purity Options
- unpurified (peptide is detected by MS)
- unpurified with guarantee (target peptide is main product)
- > 70% (HPLC-MS)
- > 80% (HPLC-MS)
- > 90% (HPLC-MS)
- > 95% (HPLC-MS)
- > 98% (HPLC-MS)
- > 98% (UPLC-HRMS)

Quality Control Options
We provide quality control for each peptide by MS or HRMS, HPLC or UPLC and offer a wide range of additional analyses for custom peptides, e.g.
- Amino acid analysis
- Peptide content determination
- NMR
- Solubility and stability tests
- Endotoxin and sterility testing

Quality control of custom peptides. We provide the analytical data with each peptide.

Left: UPLC spectrum of peptide H-LAQLLLILSHIR-OH.
Right: HRMS spectrum of peptide H-LAQLLLILSHIR-OH.
Selected References

“Characterization of RA839, a Non-covalent Small-molecule Binder to Keap1 and Selective Activator of Nrf2 Signalling”

“Structural Insights into the Intertwined Dimer of Fyn SH2”

“Effects of Polymorphic Variation on the Mechanism of Endoplasmic Reticulum Aminopeptidase 1”
Stamogianos et al., Molecular Immunology (2015)

“IgG Antibody Responses to Recombinant gp120 proteins, gp70V1/V2 Scaffolds and a CyclicV2 Peptide in Thai Phase I/II Vaccine Trials using Different Vaccine Regimens”

“The RV 144 HIV trial is considered as one of first successful HIV vaccine trials. It has become clear that the V2 loop of gp120 is an important site for immunogenicity and protection from HIV infection. The use of JPT’s PepStar™ Microarray technology has been very useful for the correlation of the clinical outcome with humoral immune responses. As have the cyclic peptides been from JPT to validate these findings!”
J. Currier, Walter Reed Army Institute, Rockville, Maryland, USA
Specialty Peptides

We are experts in designing and producing modified peptides, labeled and cyclic peptides as well as other peptide modifications such as various peptide conjugates and peptide esters. We ensure that the most appropriate methods and techniques are selected for every peptide synthesis project. For many years our customers have grown to rely on our exceptional quality and reliability.

Our Service Includes

- Consultation with experienced scientists
- Development of a synthesis strategy by peptide chemists
- Production of building blocks
- We do not give up! Our success rate is > 99%

Capabilities

- Synthesis of building blocks that are not commercially available
- Peptide design and optimization
- Extended organic synthesis facilities
- Solution and solid phase techniques
- Conjugation of peptides to shuttle molecules, biologicals, carbohydrates and adjuvants
- Stabilizing peptides by: cyclizations, disulfide and thioether bridges, incorporation of structures, creation of stapled peptides
- Unusual modifications, peptide bond isosters, click chemistries and more

Selected References


“...Our research relies heavily on developing robust high-throughput screens with fluorescent peptides. We have found that JPT’s are the best on the market because the signal-to-noise ratio is very high, providing the sensitivity we need for the screens. Their peptides always perform well. In addition, the knowledge, wonderful customer support, and fast turnaround time provided by JPT have been invaluable in us develop the best peptides for our assays.”

C. Koehler, UCLA, Los Angeles, CA, USA
### Peptide modifications and their common uses

<table>
<thead>
<tr>
<th>Modification</th>
<th>Applications</th>
<th>Examples</th>
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</table>
| Unnatural, Unusual Amino Acids | • Increase activity, selectivity and plasma stability in drug discovery  
• Induction or stabilization of secondary structures e.g. helices, sheets, turns | • D-amino acids, homo amino acids, N-methyl-β amino acids, gamma amino acids  
• Hydroxyproline, beta-alanine, citrulline, ornithine, pyroglutamic acid |
| N-Terminal Modifications | • N-terminal acetylation to imitate the natural structure in a protein  
• Stabilization towards enzymatic degradation by exopeptidases | • Acetylation, urea, carbamate, sulfonamide, alkylamine  
• Radioligands like DOTA, NOTA, NODAGA  
• Dyes and quenchers |
| (PTMs) Post-translational Modifications | • Study of transcription, cell division, apoptosis, signal transduction, cell adhesion, cell growth, infection, immunological differentiation, bacterial proteins  
• Cys modifications for various applications e.g. proteomics experiments | • Methylation at arginine or lysine  
• Lys(GG)  
• Phosphorylation and phosphate analogs  
• Glycosylation  
• Pam3Cys, sulfonic acid  
• Methionine sulfoxide |
| Internally Quenched / FRET Peptides | • Enzymatic assays  
• FRET experiments | • Free of fluorescent impurities  
• Large variety available, e.g. Abz/ Dnp, Mca/ Dnp, EDANS/ Dabcyl, FAM/ Dabcyl |
| Cyclic Peptides | • Mimicry of secondary structures  
• Optimization of peptides (increased binding potency, selectivity, protease stability) | • Head-to-tail cyclization  
• Side-chain-to-side-chain  
• Head-to-side-chain  
• Side-chain-to-tail cyclization |
| Isotope-Labeled Peptides | • See SpikeTides™ (→ p. 16) and SpikeMix™ (→ p. 18) | • Heavy lysine (U-13C6; U-15N2)  
• Heavy arginine (U-13C6; U-15N4) |
| C-Terminal Modifications | • C-terminal amide to imitate part of a parental protein sequence  
• No additional charges in the peptide | • Acid, amide, ester, aldehyde, pNA, Amc, hydrazide, CMK, biotin, labels and dyes |
| Fluorescent Dye Labeled Peptides | • Protein binding studies  
• Localization experiments | • Examples: Abz, FITC, FAM, Alexa Fluor, TAMRA, Mca, Dylight, Cy3, Cy5 |
| Biotinylated and Tagged Peptides | • Detection of tagged peptides (e.g. with labeled antibodies)  
• Separation of tagged peptides from untagged ones | • Biotin, desthiobiotin  
• Flag, Myc, HA tags  
• Tat, oligo arginine tags  
• Linkers and spacers |
| Linker / Spacer / PEGylations | • Enhancing stability and bioavailability of peptides in vivo | • Beta-alanine, O1Pen, Abx, O2Oc, Tdts, PEG with various lengths |
| Peptide Dimers | • Increase in affinity (e.g. GPCR ligands)  
• Increased immune response (MAPs) | • Chemoselective dimerization methods by formation of Cys-maleimide thioethers, disulfides or triazoles |
| Protein Conjugates / Immunogenic Peptides | • Generation of anti-peptide antibodies | • KLH, BSA, HSA, OVA |
Clinical Peptides

Our enhanced production environment for Clinical Peptides & Pools goes beyond ISO 9001:2015 regulations to meet the more stringent product requirements of immunotherapy as well as vaccine and drug development. Thus, the resulting Clinical Grade & ISO Plus Peptides & Pools have been approved for specific clinical trials in the USA and in Germany.

Quality Assurance and Control

- Vendor qualification
- Incoming material inspection
- ADCF policy
- Cleaning validation
- Full traceability
- QC/QA documentation
- Batch release control

Optional Analyses

- Chemical analyses acc. to ICH guidelines, e.g. residual solvent and peptide content determination, amino acid analysis, UPLC measurement, stability and solubility testing
- Microbiological analyses, e.g. endotoxin and bioburden determination, sterility testing, bacteriostatic and fungistatic effect

Why choose JPT?

- More than 20 years experience on peptides as drugs, vaccines and for cell therapies
- Comprehensive know-how and dedicated staff make us the peptide experts
- QC beyond ISO 9001:2015 regulations
- Track record of successful clinical peptide projects
- Publication record of clinical trials using JPT

We recently demonstrated the feasibility and clinical benefit associated with the infusion of rapidly generated single-culture VSTs, manufactured using JPT’s Clinical Grade PepMix™ Peptide Pools covering 12 immunogenic antigens from five viruses (EBV, AdV, CMV, BK, and HHV6). When administered to 11 allogeneic stem cell transplant recipients, 8 of whom had up to four active infections, these VSTs produced an overall 94% response rate.

A. M. Leen, Baylor College of Medicine, Houston, TX, USA
Quality Levels

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<tbody>
<tr>
<td>Applications</td>
<td>Epitope Discovery &amp; Immune Monitoring</td>
<td>T-Cell Expansion &amp; DC Pulsing</td>
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<tr>
<td>Incoming Material Inspection</td>
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<tr>
<td>Vendor Qualification</td>
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<td>ADCF Policy</td>
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<tr>
<td>Batch Release</td>
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<tr>
<td>Certificate of Analysis</td>
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<td>x</td>
</tr>
<tr>
<td>Document Management &amp; LIM-Systems</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Cleaning Validation</td>
<td></td>
<td>x</td>
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<tr>
<td>Line Clearance</td>
<td></td>
<td>x</td>
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<tr>
<td>Delivery in Certified Vials</td>
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<td>x</td>
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<tr>
<td>Optional Services: Residual Solvents; Sterility, Endotoxin; Monitored Storage…</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

Selected References

- “Peptide-stimulated Expansion of Virus-specific T cells for Preventative Treatment After Allogeneic Stem Cell Transplantation”
  Gary et al., AppNote (2015)

- “Activity of Broad-Spectrum T Cells as Treatment for Adv, EBV, CMV, BKV, and HHV6 Infections After HSCT”

- “Broadly-specific Cytotoxic T Cells Targeting Multiple HIV Antigens Are Expanded From HIV+ Patients: Implications for Immunotherapy”
  Lam et al., Molecular Therapy (2015)

- “Expanded Cytotoxic T-cell Lymphocytes Target the Latent HIV Reservoir”
  Sung et al., Journal of Infectious Diseases (2015)

- “Ex vivo Expansion of Human T cells for Adoptive Immunotherapy Using the Novel Xeno-free CTS Immune Cell Serum Replacement”
  Smith et al., Clinical & Translational Immunology (2015)
Peptide Libraries & Peptide Pools

JPT is the leading worldwide provider of peptide libraries and pools. We offer a variety of modifications and specifications to comply with all assay formats in applied immunology, proteomics and drug discovery. We produce according to DIN ISO 9001:2015 regulations and in compliance with good clinical laboratory practices (GCLP).

Peptide Library Formats
- Peptide purities from crude to > 98%
- Scales from nmols to grams
- Number of peptides up to one million
- Peptide length variable depending on library platform
- Various modifications available (e.g. PTMs, labels, biotin)
- Delivery formats (e.g. microtiter plates, tube racks)

Select Your Peptide Platform

<table>
<thead>
<tr>
<th>Peptide Platform</th>
<th>Peptide Specification</th>
<th>Assay Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>PepTrack™</td>
<td>Purified peptides with and without post-translational modifications (glycosylation, methylation, phosphorylation, acetylation and more)</td>
<td>Cell-Based Assays (ELISPOT, ICS, etc.)</td>
</tr>
<tr>
<td>PepMix™</td>
<td>Premade peptide pools for infectious or tumor antigens (protein spanning overlapping peptides)</td>
<td>T-cell assays (ELISPOT, Flow cytometry, ICS)</td>
</tr>
<tr>
<td>BioTides™</td>
<td>Biotinylated peptides (e.g. for immobilization to streptavidin coated beads, membranes, microarrays)</td>
<td>Binding Assays (Biacore, ILB, Microarrays, etc.)</td>
</tr>
<tr>
<td>Enzyme Substrate Sets</td>
<td>Peptides containing phosphorylation or cleavage sites</td>
<td>Enzymatic Assays</td>
</tr>
<tr>
<td>SpikeTides™</td>
<td>Proteotypic peptides unlabeled or heavy isotope-labeled with or without quantitation</td>
<td>SRM/MRM Assays</td>
</tr>
<tr>
<td>PepTrack™</td>
<td>Peptides labeled with fluorescence dyes of varying absorption and emission wavelengths</td>
<td>Fluorescence Based Assays</td>
</tr>
<tr>
<td>Micro-Scale Peptides</td>
<td>Large numbers of small scale peptides at low cost</td>
<td>High-Throughput Screening</td>
</tr>
<tr>
<td>Histone Code Peptide Sets</td>
<td>Library of biotinylated and non-biotinylated histone peptides with numerous post-translational modifications</td>
<td>Protein-Histone Interaction Studies</td>
</tr>
<tr>
<td>SpikeTides™ Sets and SpikeMix™</td>
<td>Premade sets and mixes for specific protein families, e.g. tumor associated antigens, peptide hormones, metabolic enzymes or cytokines</td>
<td>MRM/SRM Assays</td>
</tr>
<tr>
<td>Our Peptide Library Solution</td>
<td>Discuss your specific requirements with JPT’s peptide experts</td>
<td>Your Assay Requirement</td>
</tr>
</tbody>
</table>

JPT’s peptide libraries range from economic small scale libraries consisting of unpurified peptides to specific and complex collections of purified peptides. They vary in amounts, QC/QA measures as well as peptide modifications including phosphorylation, alkylation, glycosylation and many more.
Selection of JPT’s Peptide Library Types

Overlapping Peptide Scan

An overlapping peptide scan is generated to identify epitopes, substrates or other binding sites within a given protein sequence. A free and easy-to-use tool for generation of overlapping peptide sequences can be found on our website (www.jpt.com/support/software).

Cyclization Library

The formation of different cycles within the peptide sequence mimics different loops within the corresponding protein.

Alanine Scanning Analysis

Each residue is substituted for an alanine enabling identification of key residues in your peptide sequence.

Truncation Analysis

Truncation of the peptide sequence from both termini results in identification of the minimum epitope, substrate or binding motif.

Neo Epitope Library

Fast assembly and pooling of neo epitopes directly from NGS results.

Positional Scanning Analysis

One or all residues within the peptide are replaced by all 20 natural amino acids (or modified ones, analogs and others) to identify motifs within consensus sequences.
PepTrack™ Peptide Libraries

Our customized peptide libraries offer unlimited flexibility. They are optimized for antigen-specific stimulation of T-cells in immune monitoring, T-cell epitope identification, and development of cellular therapies. We implemented specific parameters for synthesis, purification and analysis of peptide libraries that are important to avoid false positive T-cell responses or toxic inhibition of T-cells and increase shelf-life of peptides.

Specifications
- Tailored peptide libraries
- Different quality grades (see table)
- Optimized for cellular assays
- PTMs and labeling available
- Production ISO 9001:2015 certified

Selected References
- “Conformational Instability Governed by Disulfide Bonds Partitions the Dominant From Subdominant Helper T-cell Responses Specific for HIV-1 Envelope Glycoprotein gp120” Nguyen et al., Vaccine (2015)
- “Mutant MHC Class II Epitopes Drive Therapeutic Immune Responses to Cancer” Kreiter et al., Nature (2015)
PepTrack™ Options

<table>
<thead>
<tr>
<th></th>
<th>Purity</th>
<th>QA/QC*</th>
<th>Length **</th>
<th>Scale**</th>
<th>Delivery Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast Track</td>
<td>Unpurified</td>
<td>5% LC-MS</td>
<td>5-15 aa</td>
<td>50 - 100 nmol</td>
<td>Freeze-dried in 96-well plates</td>
</tr>
<tr>
<td>Research Track</td>
<td>Unpurified</td>
<td>LC-MS each peptide</td>
<td>7-15 aa</td>
<td>1-5 mg</td>
<td>Freeze-dried in 96-tube racks</td>
</tr>
<tr>
<td>Research Track Plus</td>
<td>Main product = target peptide</td>
<td>LC-MS each peptide</td>
<td>7-15 aa</td>
<td>1-5 mg</td>
<td>Freeze-dried in 96-tube racks</td>
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<tr>
<td>Research Track Plus</td>
<td>&gt; 70%</td>
<td>LC-MS each peptide</td>
<td>7-15 aa</td>
<td>1-5 mg</td>
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<tr>
<td>Trial Track</td>
<td>&gt; 80%</td>
<td>LC-MS each peptide</td>
<td>7-15 aa</td>
<td>1-5 mg</td>
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<tr>
<td>Trial Track Plus</td>
<td>&gt; 90% &gt; 95% &gt; 97%</td>
<td>LC-MS each peptide</td>
<td>7-15 aa</td>
<td>1-5 mg</td>
<td>Freeze-dried in 96-tube racks</td>
</tr>
</tbody>
</table>

* Please inquire for additional QC
** Please inquire for larger amounts and longer peptides

“For reliable monitoring of tumor and virus specific T-cell responses we have a permanent need for peptides and peptide pools that are produced in a regulated environment for application in a clinical environment. JPT has been a long term and dedicated partner in this regard which continuously works on improving it’s peptide based services.”

C. Scheibenbogen, Charité Berlin, Berlin, Germany
PepMix™ Peptide Pools for T-cell Assays

JPT’s PepMixes™ are synthetic peptide pools containing overlapping peptide scans through antigens or selected MHC restricted epitopes. Each peptide is analyzed to meet the requirements of T-cell assays. Peptides are pooled according to our proprietary validated protocol ensuring presence of all peptides in the pool.

Benefits
For reliable and validated T-cell assays such as ELISPOT, appropriate positive and negative controls are essential to confirm proper functionality of the assay and viability of the cells. Compared to commonly used controls like PHA, ConA or full length antigens, synthetic peptide pools offer the advantage of a high batch-to-batch reproducibility, application of reliable chemical and biochemical QC/QA measures, longer stability and extremely efficient immunostimulation.

Applications
Efficient in vitro stimulation of antigen-specific CD4+ and CD8+ T-cells
- For optimization and validation of T-cell assays
- For monitoring of cellular immune responses
- For vaccine efficacy testing
- As positive and negative controls
- For T-cell epitope mapping

Specifications
- Length/Overlap: 15 / 11 aa (for pooled peptide scans)
- Purity: 70% to 95% (LC-MS)
- Amount: 25 tests/vial

Selected References
- “Metabolic Regulation of Hepatitis B Immuno-pathology by Myeloid-derived Suppressor Cells”
- “The Tuberculosis Vaccine H4: IC31 is Safe and Induces a Persistent Polyfunctional CD4 T cell Response in South African Adults: A Randomized Controlled Trial”
Geldenhuys et al., Vaccine (2015)
- “Priming with a Simplified Intradermal HIV-1 DNA Vaccine Regimen followed by Boosting with Recombinant HIV-1 MVA Vaccine is Safe and Immunogenic: A Phase Ia Randomized Clinical Trial”
Munseri et al., PloSOne (2015)
- “A Phase I Trial Combining Decitabine/dendritic Cell Vaccine Targeting MAGE-A1, MAGE-A3 and NY-ESO-1 for Children with Relapsed or Therapy-Refractory Neuroblastoma and Sarcoma”
Select Your PepMix™

Cancer
Breast Cancer  Burkitt’s Lymphoma  Gastric Cancer  Genital Cancer  Gioma Hodgkin’s Lymphoma  Leukemia  Liver Cancer  Melanoma  Merkel Cell Carcinoma  Nasopharyngeal Carcinoma  Ovarian Cancer  Prostate Cancer  Testicular Cancer

Controls
CEF Pool  CEF (ext.) Pool  CEFT Pool  EF Pool  HCMV (pp65)  HCMV (IE1)  HCMV (IE2)  Human (Actin)  Human (MOG)

Customized PepMix™
We offer fast and low priced production of tailored PepMixes™ from your specific antigen, neo epitopes or peptide library. We help choosing the appropriate peptide purity, specifications and pool layout.

Matrix Pools
Matrix pools offer an efficient way to map epitopes by presenting each peptide in two different pools. Have a look at the figure below! Our customer support team will assist you with the design.

Infections
AAV  BKV  Candida  CMV  EBV  F. tularensis  HAdV  HBV  HCMV  HEV  HHV  HHV2  HIV  HPV  Influenza A  L. monocytogenes  RLCV  RSV  VACV  VZV  YFV  Zaire ebola virus  Zika virus

A full up-to-date list can be found on: www.shop.jpt.com

“[…] we utilised the PepMix™ CEF Pool (extended) as well as a custom synthesized PepMix™ spanning the core region of HBV genotype D. […] Our entire experience with JPT, from ordering/delivery to use in the lab was excellent. […] JPT will remain our “go-to” company for purchasing peptides.”

L. Pallett, Infection and Immunity, University College London, UK

Customized Matrix Pools enable the fast and minimal material consuming identification of the epitope(s) within an antigen. Each peptide is present in only two Matrix Pools. In the example shown, 64 peptides are pooled into 16 Matrix Pools. Pools V and XIII elicit a T-cell response. Only peptide 37 is present in both pools and therefore is the peptide containing the epitope.

<table>
<thead>
<tr>
<th>Pool No.</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
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<td>XIV</td>
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<td>XV</td>
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<td>XVI</td>
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</tr>
</tbody>
</table>

Master Pool contains all 64 peptides.
Matrix Pool I contains peptides 1, 9, 17, 25, 33, 41 and 49.
Matrix Pool II contains peptides 2, 10, 18, 26, 34, 42, 50 and 58.
Matrix Pool IX contains peptides 1, 2, 3, 4, 5, 6, 7 and 8.
Matrix Pool X contains peptides 9, 10, 11, 12, 13, 14, 15, 16.
SpikeTides™ Isotope-Labeled Peptides

JPT developed a synthesis technology to enable ultra-fast, highly parallel and inexpensive synthesis of small scale isotopically labeled peptides. They are ideally suited for proteome wide profiling using SRM/MRM proteomic assays. In addition, these peptides can be delivered absolutely quantified in a most reliable and economic way.

Selected References

→ “Needles in the Blue Sea: Sub-Species Specificity in Targeted Protein Biomarker Analyses Within the Vast Oceanic Microbial Metaproteome”
  Saito et al., Proteomics (2015)

→ “Targeted Proteomics of Human Metapneumovirus in Clinical Samples and Viral Cultures”
  Foster et al., Analytical Chemistry (2015)

→ “Biomarker Development for Intraductal Papillary Mucinous Neoplasms Using Multiple Reaction Monitoring Mass Spectrometry”
  Kim et al., J. Proteome Res (2015)

→ “Prediction of Colorectal Cancer Diagnosis Based on Circulating Plasma Proteins”
SpikeTides™ Options

SpikeTides™ – light
• Small scale, unpurified, unlabeled proteotypic peptides with C-terminal Arg or Lys for optimization and validation of multiplexed SRM assays
• Delivery format: Freeze dried in 96-well plates

SpikeTides™_L – heavy
• Isotopically labeled, small scale, unpurified proteotypic peptides with C-terminal heavy Arg or Lys for development of SRM assays and relative quantitation of proteins using a single product
• Delivery format: Freeze dried in 96-well plates

SpikeTides™_TQ – light and quantified
• Quantified, small scale, unlabeled proteotypic peptides. Each peptide carries a Quanti-Tag that will be cleaved by trypsin digestion
• Delivery format: Freeze dried in 96-tube racks (5 aliquots per peptide)

SpikeTides™_TQL – heavy and quantified
• Quantified and heavily labeled, small scale, proteotypic peptides. Each peptide carries a Quanti-Tag that will be cleaved by trypsin digestion
• Delivery format: Freeze dried in 96-tube racks (5 aliquots per peptide)

"My group studies the proteomic composition of distinct chromatin domains, the mechanisms that operate to maintain the composition of histone modifications and the associated proteins. For precise and accurate identification and quantification of histone peptides that carry multiple post-translational modifications directly from biological samples JPT’s SpikeTides™_TQL peptide standards proved to be of excellent value for our research in various projects."

A. Imhof, Adolf-Butenandt Institute, University of Munich, Germany

<table>
<thead>
<tr>
<th>Purity*</th>
<th>QA/QC</th>
<th>Scale*</th>
<th>Delivery</th>
<th>Delivery Format</th>
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<tbody>
<tr>
<td>SpikeTides™ – light</td>
<td>Unpurified</td>
<td>5% LC-MS</td>
<td>50 nmol</td>
<td>3 weeks</td>
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<tr>
<td>SpikeTides™_L – heavy</td>
<td>Unpurified</td>
<td>5% LC-MS</td>
<td>10 nmol</td>
<td>3 weeks</td>
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<tr>
<td>SpikeTides™_TQ – light and quantified</td>
<td>Unpurified/Purified</td>
<td>100% LC-MS</td>
<td>5 x 1 nmol (target peptide)</td>
<td>5 weeks</td>
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<tr>
<td>SpikeTides™_TQL – heavy and quantified</td>
<td>Unpurified/Purified</td>
<td>100% LC-MS</td>
<td>5 x 1 nmol (target peptide)</td>
<td>5 weeks</td>
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<tr>
<td>Maxi SpikeTides™<em>QL</em> AAA</td>
<td>&gt; 95%</td>
<td>100% LC-MS &amp; AAA</td>
<td>10 x 1 nmol (target peptide)</td>
<td>5 weeks</td>
</tr>
</tbody>
</table>

* Please inquire for higher purity or larger amounts
SpikeMix™ Peptide Pools & Sets

Our inexpensive stable isotope-labeled peptide pools and sets for use in mass spectrometry-based proteomics feature large numbers of heavy peptides, e.g., for cytokines, peptide hormones and tumor associated antigens. All heavy peptides are stable isotope-labeled using heavy arginine (U-13C6; U-15N4) or lysine (U-13C6; U-15N2).

Applications
- Biomarker discovery and validation
- Mass spectrometry based assays (SISCAPA, MRM, etc.)
- Quantitation of immunomodulators
- Standardization of mass spectrometry-based proteomics assays

Benefits
- Quantitation of multiple protein targets from a single sample
- Lowest prices for SIL peptides and quantified peptides
- Multiplexed analysis of disease status and therapeutic success

Selected References
- “Quantitative Proteomics of Bronchoalveolar Lavage Fluid in Idiopathic Pulmonary Fibrosis” Foster et al., J of Proteome Research (2015)

Select your SpikeMix™ & SpikeTides™ Set

Absolutely Quantified
Histone H3
Metabolic Enzymes

Customized
JPT offers stable isotope-labeled peptides tailored to your specifications. Alkylation and post-translational modifications are available as well as absolute quantitation.

Non-Quantified
ABRF (cross-species standard)
CEF (ext.) Cytokines (human)
Cytokines (12 further species)
Kinase Activation Loops
Peptide Hormones
Tumor Associated Antigens
Wnt Signaling Pathway

A full up-to-date list can be found on: www.shop.jpt.com

“As Director of the Protein Profiling at Yale Keck Biotechnology Resource Facility, I coordinated a collaboration between the Association of Biomolecular Resource Facilities (ABRF) standard proteomic research group (sPRG) and JPT Peptide Technologies to develop the ABRF cross-species SpikeMix™ Peptide Pool. The joint development turned out to be an extraordinarily effective endeavor and the resulting product was qualified in more than 52 proteomics labs around the globe. I was impressed by JPT’s scientific and technological capabilities as well as their enthusiasm to drive the project forward.”

C. M. Colangelo, Protein Profiling at Keck Biotechnology Resource Facility, Yale University, USA
BioTides™ Small Scale Biotinylated Peptides

BioTides™ are designed for your binding assays using streptavidin coated beads, membranes, glass slides or ELISA plates. BioTides™ are synthesized by JPT’s high-throughput synthesis method SPOT and represent the most economic source of biotinylated peptides.

Applications

• Identification and optimization of kinase-, phosphatase-, acetyltransferase- and histone deacetylase-substrates via standard screening systems (AlphaScreen, FlashPlates, SPA-Beads etc.)
• Mapping of protein/protein interaction sites (ELISA-like assays, precipitation of interacting proteins)
• Production of peptide microarrays
• Loading of columns for affinity chromatography

Benefits

• Highly parallel synthesis approach
• Turnaround: > 10,000 peptides/week
• Ready-to-use freeze dried peptides in 96-well microtiter plates
• Low cost source for small scale biotinylated peptides

Product Specifications

• Amount of 50-200 nmol per peptide
• Peptide length: 6-20mers
• N-terminally biotinylated via a hydrophilic flexible linker, ensuring proper presentation of peptides
• Unpurified but capped after each synthesis step for removal of deletion and truncation sequences during re-immobilization to streptavidine matrices
• Incorporation of non-standard amino acids and other modifications possible

Selected References

→ “Epitope Mapping via Selection of anti-FVIII antibody-Specific Phage-presented Peptide Ligands That Mimic the Antibody Binding Sites”
  Kahle et al., Thromb Haemost (2015)

→ “Evaluation of Viral Peptide Targeting to Porcine Sialoadhesin Using a Porcine Reproductive and Respiratory Syndrome Virus Vaccination-Challenge Model”
  Ooms et al., Virus Research (2013)

→ “Human IgE Against the Major Allergen Bet v 1 – Defining an Epitope with Limited Cross-Reactivity Between Different PR-10 Family Protein”
  Levin et al., Clinical & Experimental Allergy (2013)
**Peptide Arrays & Peptide ELISA**

JPT uses its proprietary PepStar™, SPOTS™ and Peptide ELISA technologies for the validated production of peptide arrays, microarrays and ELISA. Peptides are immobilized onto surfaces such as cellulose membranes or glass slides. They can represent proteins or a whole proteome as well as specific peptide sequences. Each microarray batch passes rigorous quality control ensuring high batch-to-batch reproducibility.

**Benefits of Peptide Arrays**

- Chemoselective and directed immobilization leads to proper presentation of binding sites
- Synthetic peptides have high-batch-to-batch reproducibility
- Post-translational modifications or other modifications possible

"[...] To map the epitopes of our newly generated specific anti-rat TAAR1 antibodies we used JPT’s PepStar™ Peptide Microarrays. The peptide microarrays greatly contributed to our successful and recently published study. We were very satisfied with the exceptional product and service delivered by JPT Peptide Technologies as well as their scientific Customer Support which was always at our disposal."

S. Obermüller, F. Hoffmann – La Roche Ltd., Roche Pharma Research and Early Development, Basel, Switzerland

<table>
<thead>
<tr>
<th>JPT’s Array Platform</th>
<th>Peptide Origin</th>
<th>Assay Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>PepStar™ or RepliTope™</td>
<td>Overlapping peptide libraries, epitope collections, substitution or truncation libraries, alanine scans</td>
<td>Immune Monitoring, Seromarker Discovery, Antibody Signature Profiling, Epitope Mapping &amp; Optimization</td>
</tr>
<tr>
<td>PepSpots™</td>
<td>Overlapping peptide scans through antigens, alanine-scans, substitutional or truncation analyses of identified epitopes</td>
<td>Epitope Mapping, Validation and Optimization</td>
</tr>
<tr>
<td>PepStar™ ULTRA</td>
<td>ULTRA peptide libraries with high coverage of sequence diversity, e.g. for HIV, cancer</td>
<td>Seromarker Discovery/Immune Monitoring of targets with sequence diversity</td>
</tr>
<tr>
<td>PepStar™ Multiwell Microarray</td>
<td>Selected Peptides from antigens</td>
<td>Selective Antigen Profiling</td>
</tr>
<tr>
<td>Peptide ELISA</td>
<td>Selected Peptides</td>
<td>Immune Profiling, Protein-Protein Interaction Studies</td>
</tr>
<tr>
<td>Enzyme Substrate Microarrays</td>
<td>Peptide substrates derived from annotated substrate proteins</td>
<td>Enzyme Profiling</td>
</tr>
<tr>
<td>Histone Code Peptide Microarray</td>
<td>Huge library of histone peptides with all potential post-translational modifications</td>
<td>Protein-Histone Interaction Studies</td>
</tr>
</tbody>
</table>

Selection of JPT’s array platforms and their applications.
Microarray & ELISA Assay Service

JPT offers comprehensive incubation and analysis services using its peptide microarray platforms PepStar™ and RepliTope™ or Peptide ELISA. Save time for assay set-up and optimization and take advantage of our experience in data evaluation.

Applications

- Seromarker Profiling
- Receptor-ligand interaction studies
- Antibody epitope mapping
- Mimotope identification and optimization
- Enzyme substrate identification and optimization

Benefits

- Our proprietary peptide microarray platforms
- Well established and automated assay procedures
- Sample handling and profiling regulated by DIN ISO 9001:2015 and GCLP
- Strong bioinformatic support for array design and data interpretation

Send us a short outline of your project and we will:

- Suggest the appropriate array platform to be used
- Provide bioinformatic support for peptide and microarray design
- Provide project proposal and quotation
- Synthesize peptides and generate peptide microarrays
- Incubate microarrays with your sample and perform control experiments
- Evaluate and interpret data
- Provide comprehensive and confidential report

“ [...] JPT’s PepStar™ Peptide Microarray platform as well as its full profiling service and data interpretation capabilities have been a reliable and robust approach to elucidate the molecular details of these protein-protein interactions.”

J. Schultz, Carolus Therapeutics, Inc., San Diego, USA
PepStar™ Customized Peptide Microarrays

With our PepStar™ Peptide Microarray platform we produce microarrays that combine several advantages over other microarrays. We utilize chemoselective coupling to generate microarrays displaying directed and covalently attached peptides that are purified in the process. Multiple copies of each peptide microarray are prepared with flexible layouts at unmatched economy.

**Applications**
- Incubation with proteins, patient samples, cell lysates, enzymes
- Epitope mapping and optimization
- Antibody signature profiling
- Seromarker profiling
- Immune monitoring
- Protein-protein interactions

**Benefits**
- Patented synthesis of peptides warrants high batch-to-batch reproducibility
- Directed and chemoselective immobilization ensures availability of binding sites
- Provision of thousands of identical microarrays
- Low consumption of patient materials and proteins
- High shelf stability
- High assay sensitivity

**Selected References**
- "Traceamine-associated Receptor1 Activation Silences GSK3β Signaling of TAAR1 and D2R Heteromers"  
  Harmeier et al., European Neuropsychopharmacology (2015)
- "High-Throughput Microarray Incubations Using Multi-Well Chambers"  
- "Protective Efficacy of Adenovirus-protein Vaccines Against SIV Challenges in Rhesus Monkeys"  
  Barouch et al., Science (2015)
- "Relationships Between T Cell and IgE/IgG4 Epitopes of the Anisakis Simplex Major Allergen Anis 1"  
  Alonso et al., Clin Exp Allergy. (2015)
RepliTope™ Catalog Peptide Microarrays

RepliTope™ combine all the advantages of PepStar™ Microarrays with the availability of a catalog product. We selected many common antigens from infectious pathogens and cancer types. The RepliTope™ Antigen Collections are high density peptide microarrays displaying large collections of antigens from, or even the whole proteome of a particular virus or bacterium.

Applications
- Antibody epitope mapping and optimization
- Antibody signature profiling
- Seromarker discovery
- Immune monitoring
- Protein-protein interactions

Benefits
- Premade microarrays available within days
- RepliTope™ display peptide scans through antigens or whole proteomes
- Each peptide is presented 2-4 times on each microarray to ensure reproducibility of results
- Economical access to many identical peptide microarrays

Selected References
- “Antibodies to Influenza Nucleoprotein Cross-react with Human Hypocretin Receptor 2”
- “Serum Reactome Induced by Bordetella Pertussis Infection and Pertussis Vaccines: Qualitative Differences in Serum Antibody Recognition Patterns Revealed by Peptide Microarray Analysis”
- “H1N1 Viral Proteome Peptide Microarray Predicts Individuals at Risk for H1N1 Infection and Segregates Infection Versus Pandemrix®-Vaccination”
  Aditya et al., Immunology (2015)

Selection of available RepliTope™

<table>
<thead>
<tr>
<th>Tumor Associated Antigens</th>
<th>Infectious Diseases</th>
<th>Antigen Collections</th>
</tr>
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<tbody>
<tr>
<td>Breast/Prostate</td>
<td>Adenovirus</td>
<td>HIV ULTRA</td>
</tr>
<tr>
<td>· Mammaglobin A</td>
<td>· Hexon and penton proteins</td>
<td>· Gag p17 and p24, tat, nef and env, immunogenic regions for frequent clades (A,B,C,D,G, CRF1,CRF2). Coverage for ENV 57%, GAG 72%, Nef 62% and Tat 46%</td>
</tr>
<tr>
<td>· NY-ESO-1</td>
<td>· BKV</td>
<td>HBV ULTRA</td>
</tr>
<tr>
<td>· PSA</td>
<td>· Capsid proteins (VP1, VP2, VP3)</td>
<td>· Covers 255 proteins of 53 annotated proteomes of HBV. Non-redundant sequences from genes P, S, X, C for 14 genotypes A1, A2, A3, B, B/C, B1, B2, C, D, E, F1, F2, G and H.</td>
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<tr>
<td>Epithelia</td>
<td>· Large and small T antigens</td>
<td>M. tuberculosis ULTRA</td>
</tr>
<tr>
<td>· CEA</td>
<td>· EBV</td>
<td>· 40 antigens of MTB reference strain H37Rv supplemented by 354 homologous antigens found in other M. tuberculosis strains. 17 different MTB strains are represented by 6388 peptides.</td>
</tr>
<tr>
<td>· Claudin-6</td>
<td>· HCMVA</td>
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<tr>
<td>Melanoma</td>
<td>· IE-1, IE-2, pp65,</td>
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<tr>
<td>· MAGEA1, A3 and A4</td>
<td>· UL28, UL32, UL40</td>
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<tr>
<td>· Melan-A/MART-1</td>
<td>· Influenza A</td>
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<tr>
<td>· Prame/OIP4</td>
<td>· HA, MP1 and NC from different strains</td>
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<tr>
<td>Vaccinia virus</td>
<td>· RSV</td>
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<tr>
<td>· MVA018L (Host range p. 2)</td>
<td>· Protein F, NC protein N</td>
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<td>· MVA093L (p53)</td>
<td>· Miscellaneous</td>
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<td>Wilms tumor1</td>
<td>· HBV (Large envelope protein)</td>
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<td>· WT33</td>
<td>· HHV6 (US4)</td>
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<td>Miscellaneous</td>
<td>· Yellow fever (NS24B)</td>
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<tr>
<td>· Cyclin B1</td>
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<tr>
<td>· Histone H1.2 and H4</td>
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<tr>
<td>· PS3_humen</td>
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</table>

A full up-to-date list can be found on: www.shop.jpt.com
PepSpots™ Peptide Arrays on Membranes

PepSpots™ peptides are synthesized directly on cellulose membranes by SPOT technology. The resulting PepSpots™ Peptide Arrays combine a reliable assay, easy experimental procedure (like ELISA), inexpensive equipment needs and a highly flexible array. Different array format are possible as well as post-translational and other peptide modifications. PepSpots™ are the method of choice for fast and reliable antibody epitope mapping.

Applications
- Antibody epitope mapping
- Functional characterization of mapped epitopes
- Optimization of epitopes
- Characterization of protein-protein contact sites

Benefits
- Peptides attached via a flexible linker
- Membrane for direct use
- Readout via chemiluminescence
- Hydrophilic cellulose membranes minimize unspecific interactions
- Detection of low affinity interactions
- Easy standard protocols

Selected References

“…we are collaborating with JPT for many years and are very satisfied with the relationship which led to several well received publications. Especially, their unique array technology PepSpots™ helped us to enhance our knowledge ….”

J. Schymkowitz, Vrije Universiteit Brussel, Belgium
Peptide ELISA

Peptide ELISA (Enzyme-linked immunosorbent assay) enables analysis and screening on amino acid sequence level. For example, mapping of epitopes or definition of protein interaction sites, thus providing much more information than conventional ELISA.

We offer custom peptide ELISA plates with optional incubation and assay service and an off-the-shelf Histone Peptide ELISA for screening of PTM-specific antibodies or enzymes.

Peptide ELISA specifications

- Discovery Grade:
  Unpurified peptides but truncated sequences are removed during immobilization
- Validation Grade:
  Custom Peptides with full HPLC-MS analysis and guaranteed purity

Applications for Peptide ELISA

- Antibody epitope mapping
- Immune profiling
- Determination of antibody titers
- Analysis of protein-protein interactions
- Analysis of enzymatic reactions
- Validation of microarray results

Selected References

- “Patients with Early Inflammatory Arthritis Who are Anti-CCP Antibody Positive have Antibodies Against Acetylated and Carbamylated Vimentin Peptides” Juarez et al., Rheumatology (2015)


We take pride in our competent service and swift response. Please do not hesitate to contact us for further information. We also very much welcome your feedback and comments.