

High Quality MHC and TCR Monomers for Immunological Research

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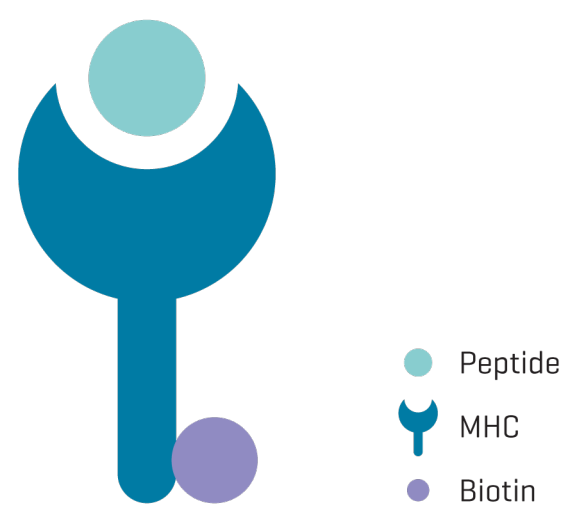
Introduction

Production of critical components such as peptide-major histocompatibility complex (pMHC) complexes and T-cell receptors (TCRs) with correct folding is challenging due to their complex structure and low-affinity ligands. By relying on more than 10 years' experience in protein expression, our team of experts has set up an effective manufacturing process with stringent quality control, providing you with high-quality pMHC and TCR Monomers. This poster describes the quality control checks used to demonstrate the production of high-quality pMHC and TCR constructs and explores the associated applications for MHC and TCR Monomers within the dynamically evolving field of immunology.

High Quality Ready-to-Use Monomers

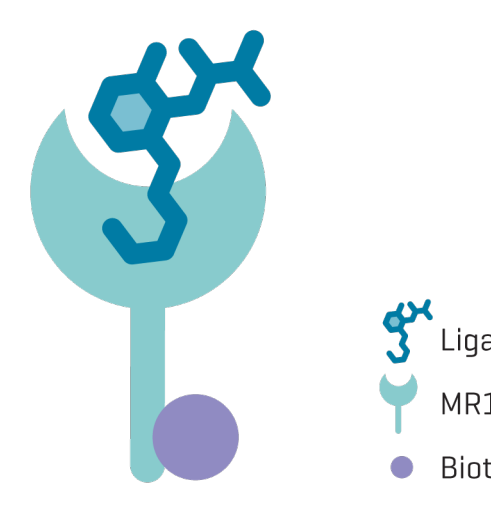
A broad range of ready-to-use MHC and TCR Monomers are available, both with or without biotin. MHC I and II Monomers are available both ready-to-use, and loadable (see peptide-receptive, below).

MHC I and MHC II Monomers



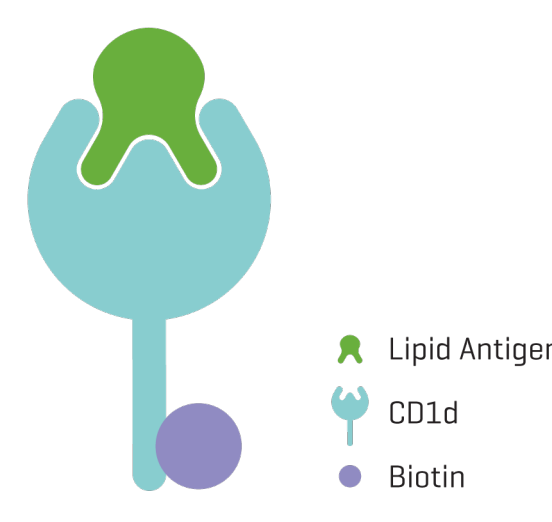
For investigation of CD8⁺ and CD4⁺ T Cells

MR1 Monomers



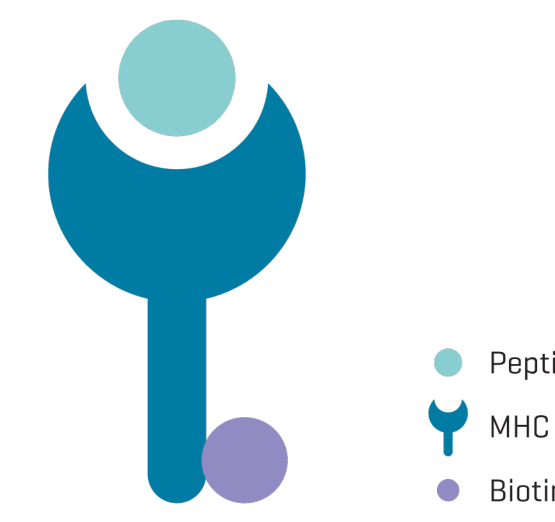
For investigation of MAIT Cells

CD1d Monomers



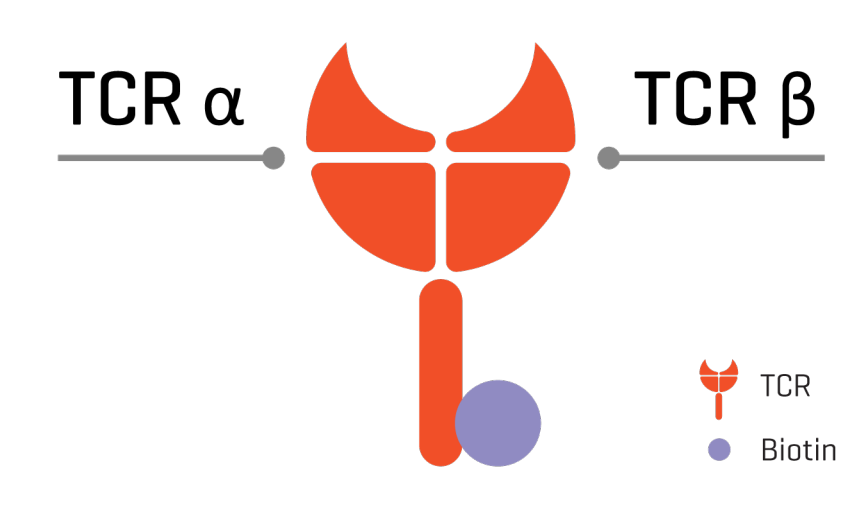
For investigation of iNKT Cells

HLA-E & HLA-G Monomers



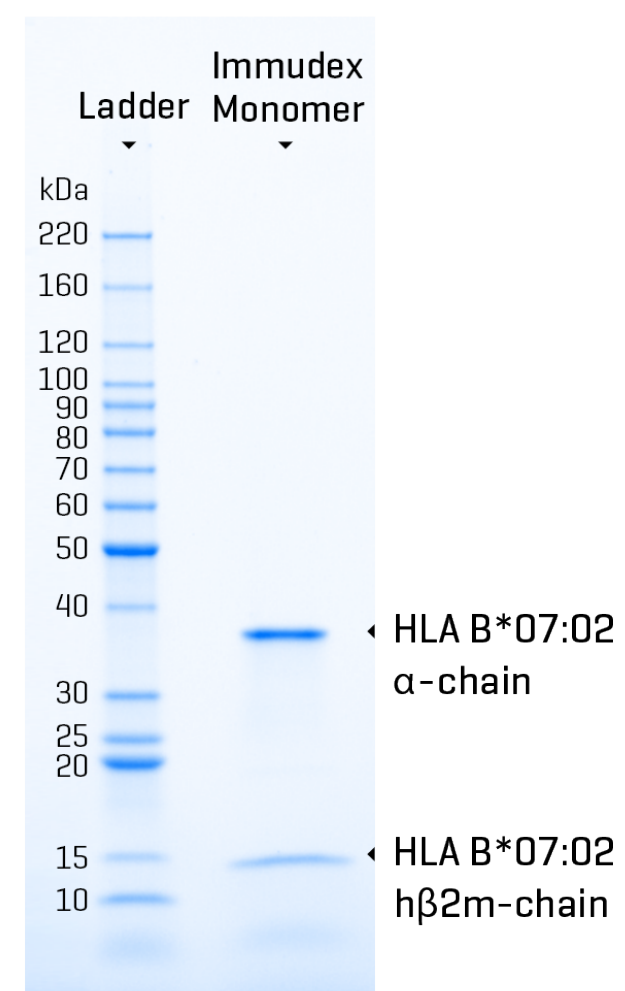
For investigation of NK Cells, Tregs and more

TCR Monomers



For investigation of Antigen-Presenting Cells

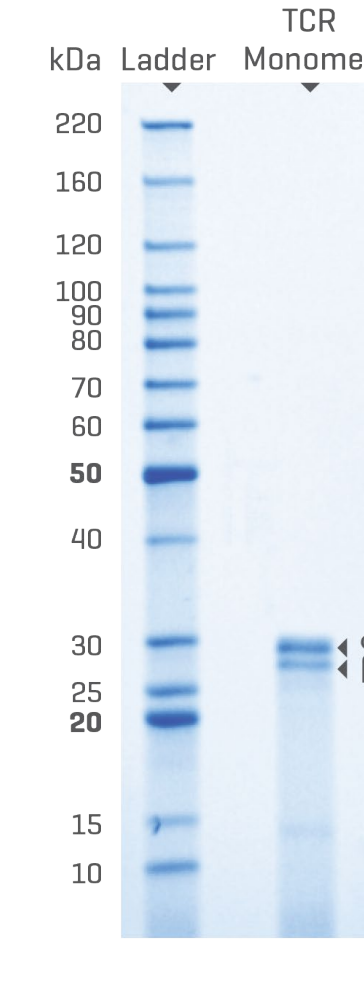
MHC Monomers: Immudex Quality Control



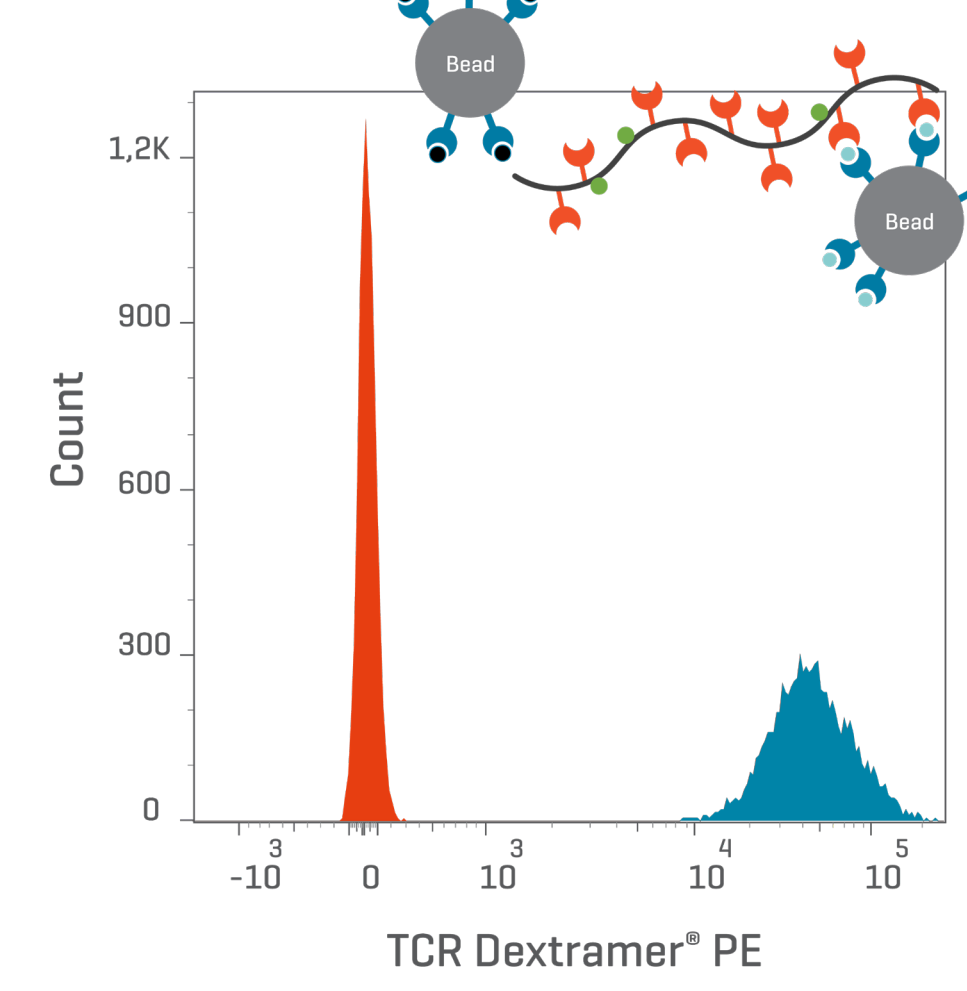
- Analysis of the performance of starting materials by flow cytometry - MHC heavy chain and $\beta 2$ microglobulin (B2M).
- Analysis of peptide-MHC (pMHC) complex integrity using a fluorescence and binding assay.
- Analysis of peptide-MHC complex purity and biotinylation using an SDS gel-shift assay.

Left: 1 μ g of MHC Monomer (HLA B*07:02 / RPHERNGFTVL, cat. no. M-WH02135) run on an SDS-PAGE Gel under reducing conditions. The high purity of the MHC Monomer is evidenced by absence of degradation products.

TCR Monomers: Immudex Quality Control



SDS-PAGE



FUNCTIONALITY AND SPECIFICITY ASSAY

- SDS-PAGE gel confirms TCR alpha and beta chains are present at the correct sizes (23 and 29 kDa, respectively).
- Testing functionality and specificity of TCR by generating TCR Dextramer[®] reagents and analyzing them by flow cytometry.
 - Orange peak = negative control pMHC (irrelevant pMHC that should not interact with the TCR Dextramer[®])
 - Blue peak = the shift indicates the binding of the TCR Dextramer[®] to its cognate pMHC

Peptide-Receptive MHC Monomers

easYmers[®] and U-Load[®] MHC II are formulations of peptide-receptive MHC I and II monomers, which can be used to generate specific pMHC complexes by loading your peptide of choice.



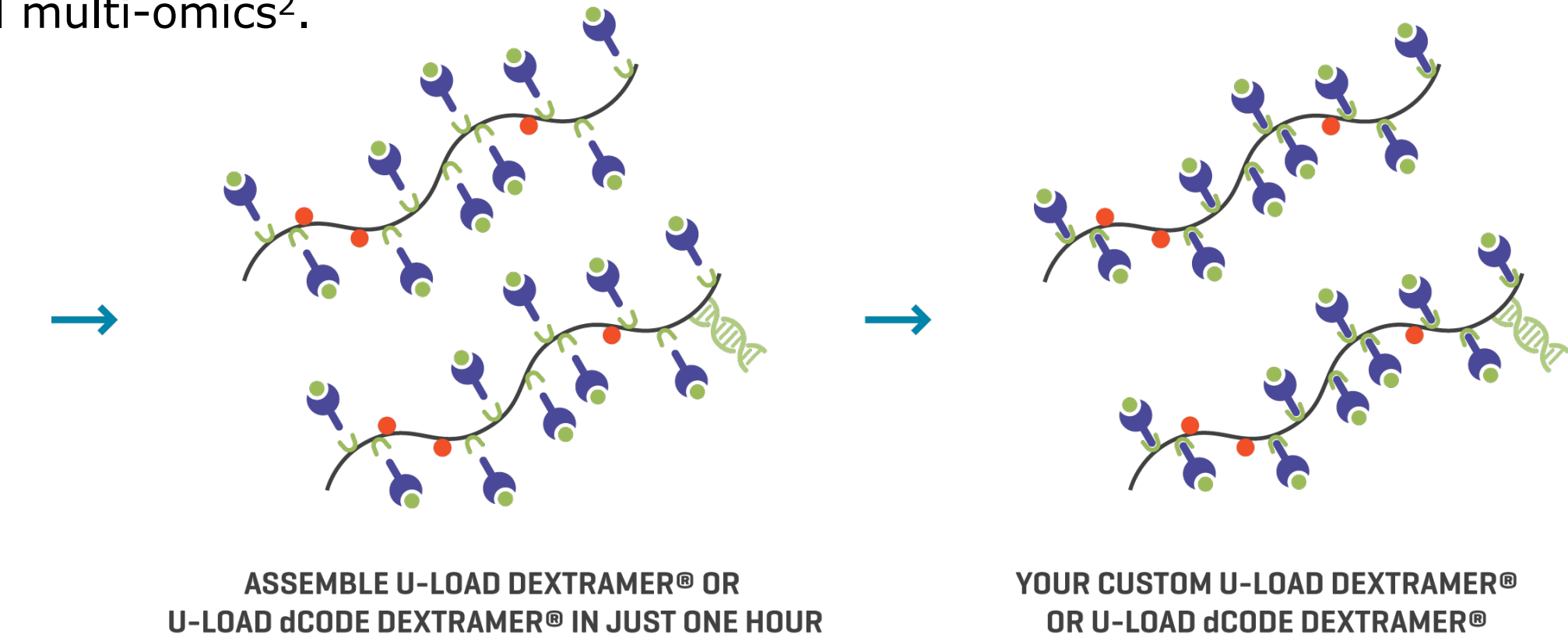
EMPTY MHC I OR MHC II MONOMER

ADD YOUR PEPTIDE OF CHOICE

INCUBATE

Flexibility to Assemble Your Own MHC Multimers

easYmers[®] or U-Load[®] MHC II-peptide complexes can easily be loaded onto fluorescently-labeled U-Load Dextramer[®], U-Load dCODE Dextramer[®], or other lab-developed MHC multimers, for detection of antigen-specific CD8⁺ or CD4⁺ T cells using flow cytometry¹ or single-cell multi-omics².



ASSEMBLE U-LOAD DEXTRAMER[®] OR U-LOAD dCODE DEXTRAMER[®] IN JUST ONE HOUR

YOUR CUSTOM U-LOAD DEXTRAMER[®] OR U-LOAD dCODE DEXTRAMER[®]

Broadest Allele Coverage

To satisfy the diverse research needs of our customers, our list of MHC alleles is constantly expanding.

Human	Primate	Mouse
64 MHC I 7 MHC II MR1 CD1d HLA-E HLA-G	3 MHC I	7 MHC I

More than 65 additional Human, Primate and Mouse alleles are available through Immudex Custom Solutions and Services.

MHC Monomers [GMP]

MHC Monomers (GMP) are manufactured by Immudex following good manufacturing practice and meet the requirements for medical devices defined by ISO13485 and 21CFR820.

References

- Pai *et al.*, 2023, Cancer Cell 41(4), 776-790.
- Minervina *et al.*, 2022, Nature Immunology 23, 781-790.
- Hölzemer *et al.*, 2015, PLoS Med 12(11): e1001900.

Applications of MHC and TCR Monomers

Immunogenicity Assessment

For protein drugs, *in vitro* assays are employed to evaluate the binding of (neo)-epitopes with MHC molecules¹.

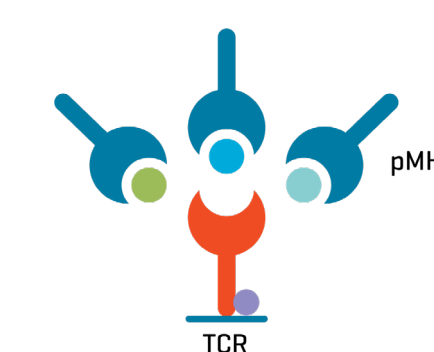


Epitope and TCR Discovery

Multiplex screening of large epitope panels using a library of dCODE Dextramer[®] reagents assembled using loadable MHC Monomers. Simultaneously identify the TCR sequences as well as the epitopes with which the TCRs interact. For applications including TCR-T cell therapy.

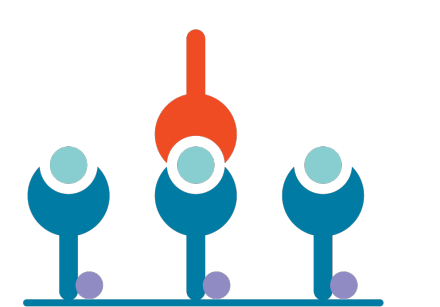
TCR:pMHC Binding Affinity

Use pMHC and soluble TCR monomers to assess TCR:pMHC binding affinity by Surface Plasmon Resonance³, lateral flow assays or plate-based assays.



Identification of TCR-like antibodies

Immunization of pMHC complexes in animal models to identify TCR-like antibodies recognizing the pMHC. Use pMHC complexes to screen libraries of specific TCR-like antibodies.



pMHC Binding Affinity

Use plates coated with peptide-receptive MHC monomers and load with candidate epitopes to assess the strength of binding affinity between the MHC and each peptide.

TCR Validation

Screen for functionality of candidate TCRs against target pMHC Monomers.

TCR Cross-Reactivity

Screen TCR specificity using plate-based assays/ELISA with immobilized soluble TCR Monomers and libraries of pMHC monomers including potential off-target antigens.

T-Cell Stimulation or Enrichment

Use pMHC complexes to stimulate CD8⁺ and CD4⁺ T cells for applications including TCR-T and CAR-T cell therapy.

Assembly of MHC Multimers

Assemble your own MHC multimers, like a Dextramer[®], with our U-Load Dextramer[®] ¹ and U-Load dCODE Dextramer[®] reagents².

