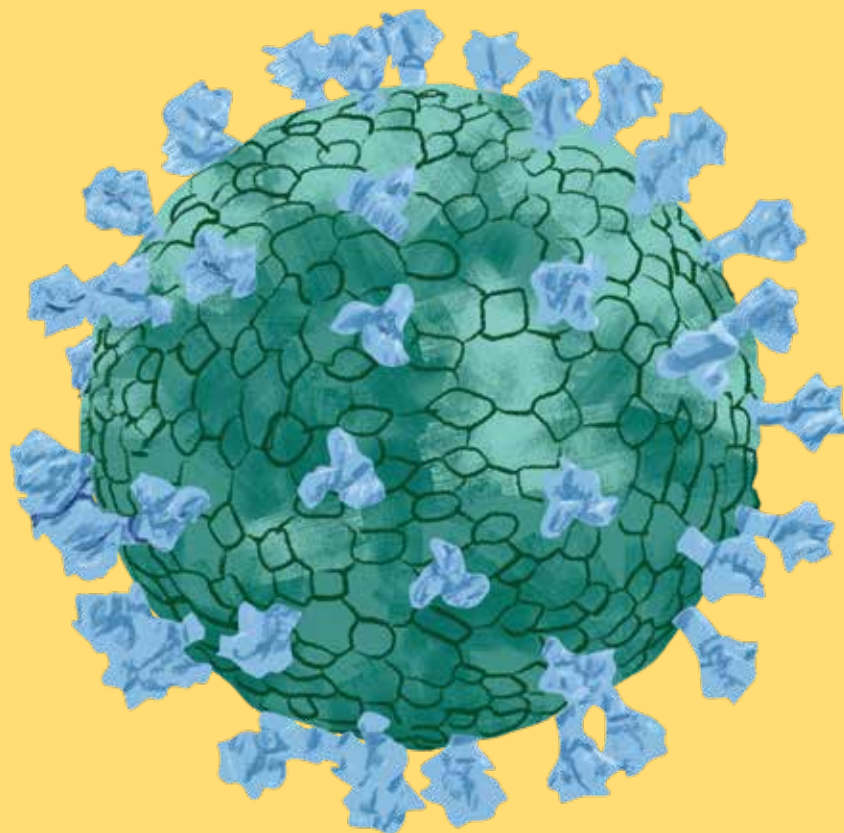


VLP & Nanodisc Displayed Antigens

Multi-pass transmembrane proteins displayed on virus-like particles or copolymer nanodiscs

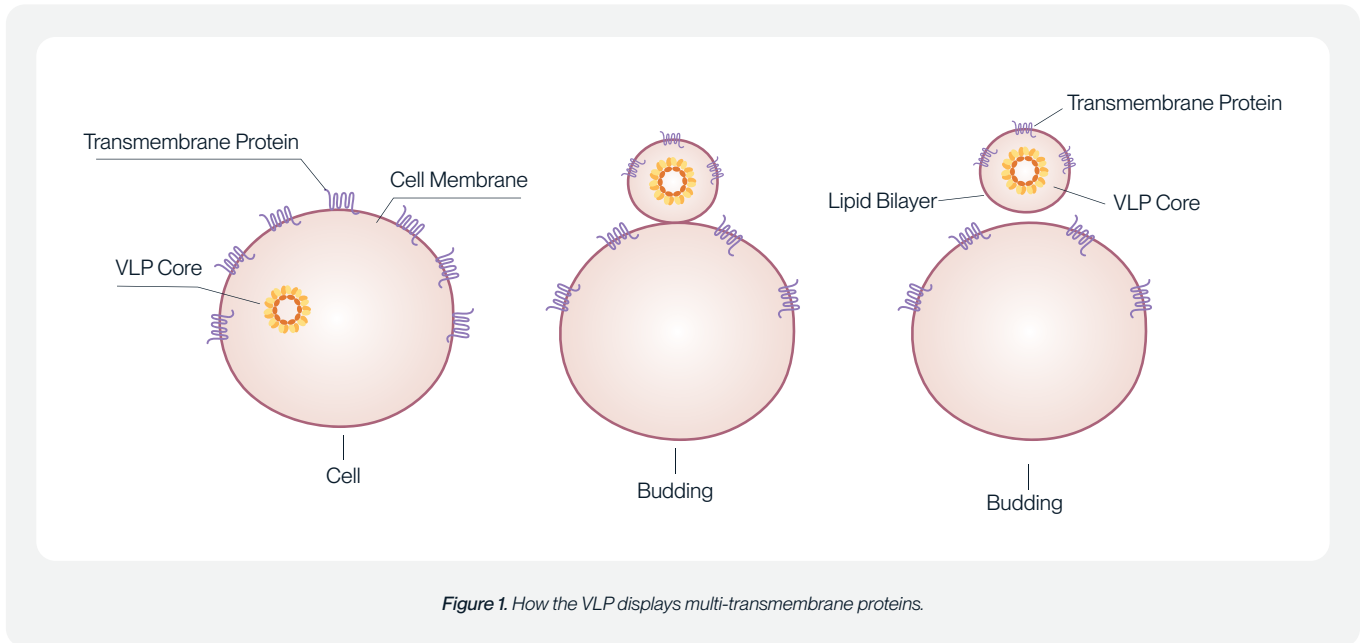


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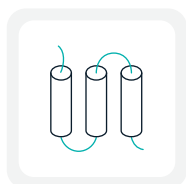
VLP-Displayed Multi-pass Transmembrane Proteins

Virus-like particles (VLPs) originate from the capsid proteins of viruses. They are tiny nanoparticles formed by the self-assembly of one or more types of capsid proteins. VLPs do not contain the infectious viral genome, making them relatively safe during production operations. With technological advancements, VLPs have demonstrated significant advantages in presenting antigens for the discovery of antibodies against challenging targets due to their effectiveness in efficiently activating both humoral and cellular immune responses in the body.



We have successfully developed a series of full-length multi-pass transmembrane proteins displayed on VLPs. These targets include Claudin 18.2, GPRC5D, Claudin 6, CD20, and more. Our VLP-displayed proteins overcome the technical barriers of membrane protein expression and stability. Additionally, the VLP structure increases immunogenicity of the target antigen for immunization campaigns. Our VLP proteins have undergone rigorous biological activity verification including SPR, BLI, and ELISA. These products feature high sensitivity, high specificity, and high stability.

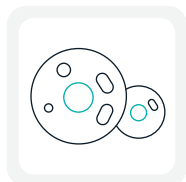
VLP | Product Advantages



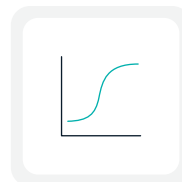
Full-length sequence expression with native structure and conformation



Boosted immunogenicity



Mammalian expression



Activity Verification via ELISA, SPR, FACS, etc.

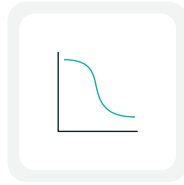
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VLP | Product Applications



Animal
Immunization



In vitro efficacy and
Pharmacokinetic Studies



Antibody Screening



ELISA, SPR, BLI and
other analytical tests

VLP | Product Performance Validation

ELISA | Claudin 18.2 VLP

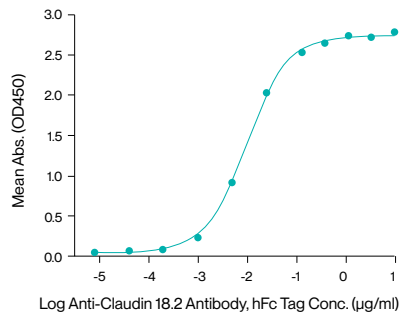


Figure 2. ELISA data confirms that Human Claudin 18.2 VLP can bind to Anti-Claudin 18.2 antibody with an EC_{50} value of 9.8ng/mL.

Catalog No. CLD-HE1822

SPR | Biotinylated Claudin 18.2 VLP

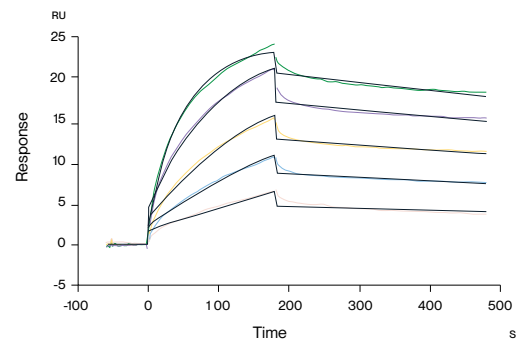


Figure 3. SPR data confirms that Biotinylated Human Claudin 18.2 VLP can specifically bind to Anti-Claudin 18.2 antibody with an affinity constant of 1.28 nM.

Catalog No. CLD-HE1822B

BLI | Biotinylated Claudin 18.2 VLP

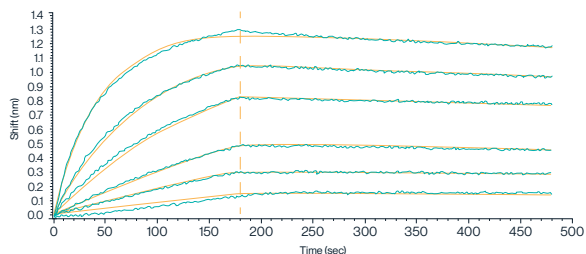


Figure 4. BLI data demonstrates high binding affinity ($K_D=5.73E-10$ M) of Biotinylated Human Claudin 18.2 VLPs to streptavidin-labeled probes.

Catalog No. CLD-HE1822B

SPR | Biotinylated GPRC5D VLP

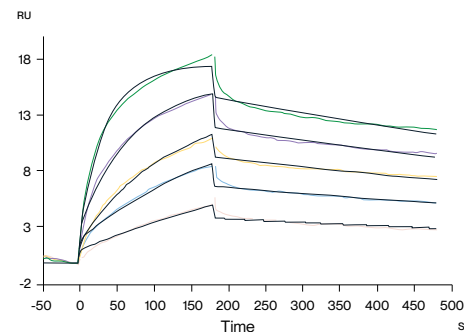


Figure 5. SPR data confirms that Biotinylated Human GPRC5D VLP can specifically bind to Anti-GPRC5D antibody with an affinity constant of 0.30 nM.

Catalog No. GPR-HM05PB

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Nanodisc-Displayed Multi-pass Transmembrane Proteins

KACTUS Copolymer Nanodiscs are a novel technology displaying membrane proteins in native conformations. Traditional membrane scaffold protein nanodiscs rely on detergents for membrane protein extraction and stabilization for reconstitution. Our innovative approach allows copolymer nanodiscs to be prepared directly from cells with detergent-free extraction. Our Nanodisc products offer mammalian-expressed full-length solubilized membrane proteins for analytical assays including ELISA, SPR, and BLI.

Nanodisc Structure & Expression

Full-length multi-pass transmembrane proteins are expressed in HEK293 cells. Copolymers interact with the membrane to form a disc-like structure around the target protein. The cellular phospholipids are retained, creating a stable nanodisc that mimics the natural membrane environment. This approach avoids the pitfalls of detergent extraction and streamlines the production process.

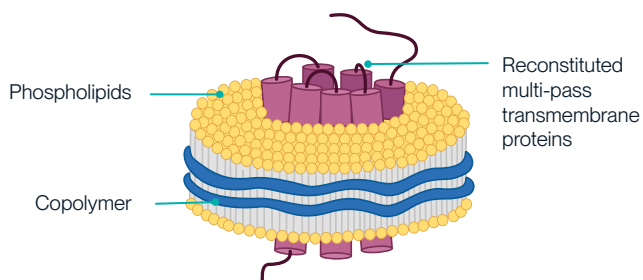


Figure 6. Schematic diagram of a copolymer nanodisc displaying a multi-transmembrane protein.

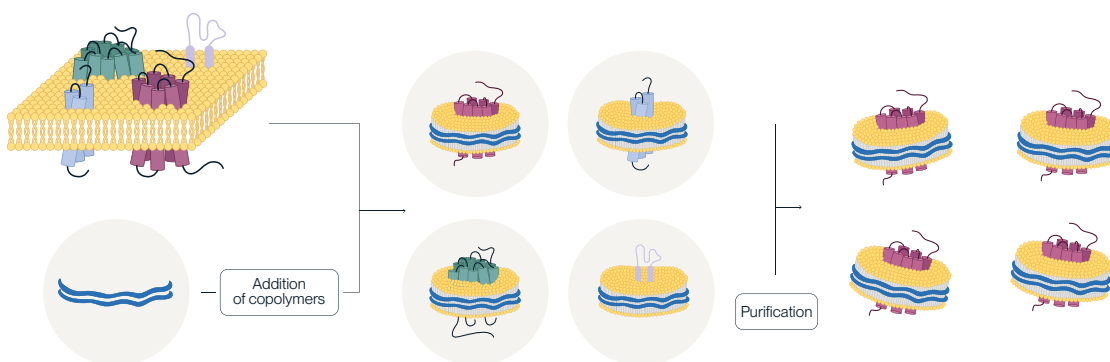
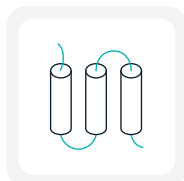
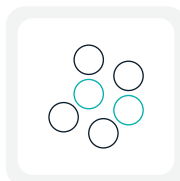


Figure 7. Schematic diagram of copolymer nanodisc expression and purification.

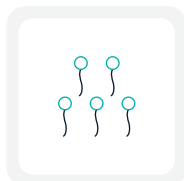
Nanodisc | Product Advantages



Native membrane protein structure and conformation



Water-solubilized full-length proteins



Detergent-free extraction to preserve protein activity



Activity verification via ELISA, SPR, FACS

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Nanodisc | Applications



Antibody Panning



In vitro
Pharmacokinetic Studies



Antibody Screening



ELISA, SPR, BLI and
other analytical tests

Nanodisc | Product Performance Validation

ELISA | GPRC5D Nanodisc

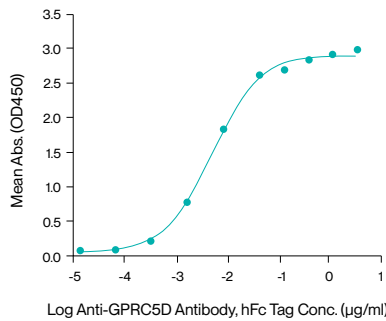


Figure 8. ELISA data demonstrates Human GPRC5D Nanodisc can bind to Anti-GPRC5D antibody with an EC50 of 4.9ng/mL.

Catalog No. GPR-HM15P

ELISA | Biotinylated GPRC5D Nanodisc

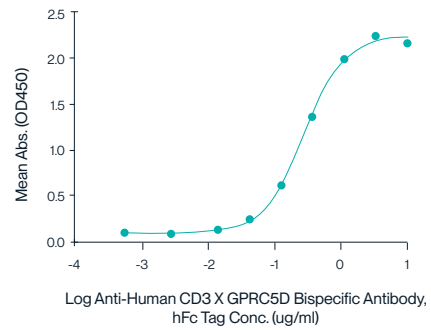


Figure 9. Human CD3E&CD3D was immobilized on the plate, followed by Anti-Human CD3×GPRC5D Bispecific Antibody binding, followed by Biotinylated Human GPRC5D Nanodisc. Results demonstrate quality performance in ELISA to of the nanodisc to Anti-Human CD3×GPRC5D bispecific antibody with an EC50 of 0.28 µg/mL.

Catalog No. GPR-HM45PB

BLI | Biotinylated GPRC5D Nanodisc

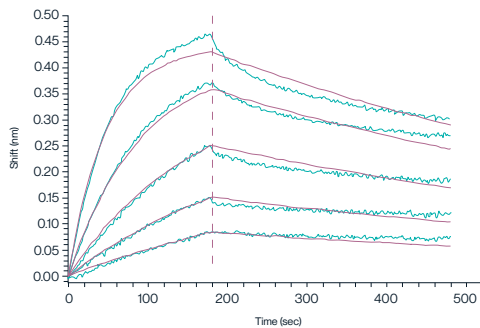


Figure 10. BLI data demonstrates Biotinylated Human GPRC5D Nanodisc can bind to Anti-GPRC5D Antibody with high affinity (KD=1.16nM).

Catalog No. GPR-HM45PB

SPR | GPRC5D Nanodisc

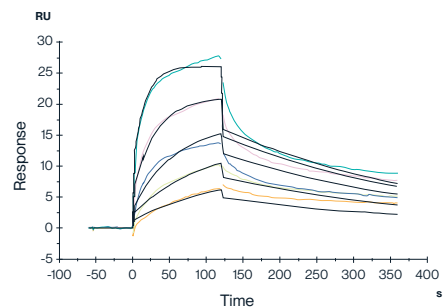


Figure 11. SPR data demonstrates Human GPRC5D Nanodisc can bind to Anti-GPRC5D Antibody with a high affinity (KD = 1.47nM).

Catalog No. GPR-HM15P

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Application of GPRC5D Copolymer Nanodisc in Isolating GPRC5D Binders for Yeast Display Antibody Discovery

Our Copolymer Nanodisc effectively facilitated the identification of high-binding anti-GPRC5D antibody clones via yeast display. The Biotinylated GPRC5D Nanodisc (Cat No. GPR-HM45PB) showed strong and specific binding interactions with various monoclonal antibodies (mAb) displayed on yeast cells, as evidenced by significant fluorescence signals across multiple antibody clones at different GPRC5D membrane protein concentrations. Importantly, the GPRC5D Nanodisc displayed no binding to control yeast cells, underscoring its suitability for selective yeast display screening.

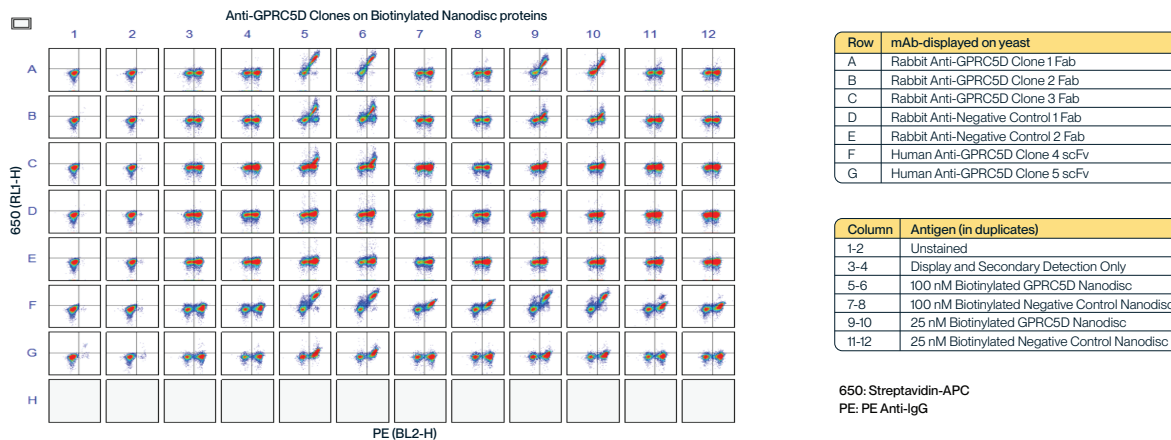


Figure 12. Plate view for Biotinylated GPRC5D Nanodisc binding various mAb displayed on yeast. Most mAb clones showed significant binding to the Biotinylated GPRC5D Nanodiscs and negative controls showed minimal or no binding, indicating specificity of the antibody clones for GPRC5D.

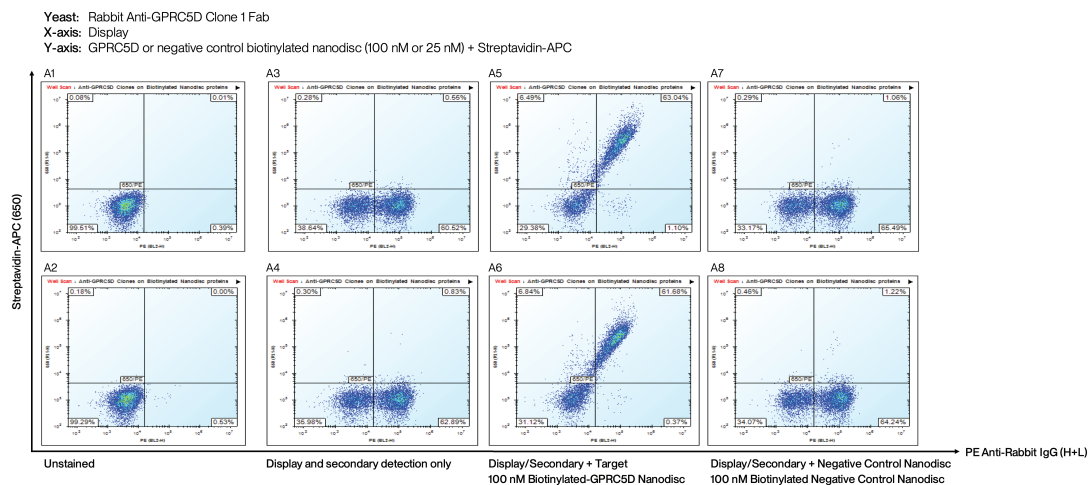


Figure 13. Biotinylated GPRC5D Nanodisc binding Rabbit Anti-GPRC5D Clone 1 Fab. Results show Rabbit Anti-GPRC5D Clone 1 Fab displayed on yeast cells binds with high specificity to Biotinylated GPRC5D Nanodisc.

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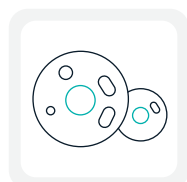
Custom VLP & Nanodisc Services

We offer innovative customized solutions for studying difficult-to-express target antigens displayed on VLPs or Nanodiscs. These platforms provide a stable and controlled environment, enabling detailed analysis of protein structure, function, and interactions. Our custom services include full-length membrane protein expression on your choice of display platform (VLP or Nanodisc), choice of biotinylation or fluorescent labeling, choice of expression system, bulk quantities, and optional SPR analytical services.

Service Features:



8 weeks turnaround time



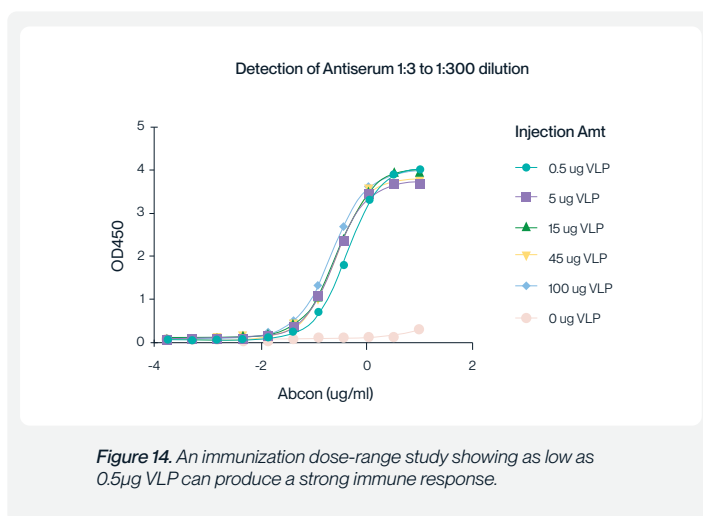
HEK293 Expression



Full-Length Protein

CXCR4 VLP Immunization Dosage & Antiserum Generation

Our team has expressed full-length CXCR4, a complex GPCR protein characterized by its seven transmembrane domains, on VLPs and demonstrated successful antiserum generation even with low dosages of CXCR4 VLP (0.5 μ g).



Areas of Expertise

| GPCRs | | | Solute Carriers | | 4HB/Tetraspanins | |
|-------|--------|---------|-----------------|---------|------------------|--------------|
| CCR2b | CB1 | GPRC5D | SLC1A4 | SLC16A3 | Claudin 1 | Claudin 18.2 |
| CCR4 | CB2 | A2AR | SLC1A5 | SLC34A2 | Claudin 3 | CD20 |
| CCR5 | CXCR4 | BILF1 | SLC7A1 | SLC40A1 | Claudin 6 | TM4SF1 |
| CCR6 | GPR75 | MRGPRX2 | SLC15A4 | SLC44A4 | Claudin 9 | |
| CCR7 | GPR77 | SSTR2 | SLC13A5 | SLC59A1 | | |
| CCR8 | GLP-1R | GCGR | SLC16A1 | | | |

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Product List

| Catalog No. | Product | Species | Tag | Express System |
|--------------|---|------------|-------------|----------------|
| A2R-HM1N1 | A2AR Nanodisc | Human | C-His | HEK293 |
| CNR-HM001 | Cannabinoid receptor 1 VLP | Human | -- | HEK293 |
| CCR-HM02BB | Biotinylated CCR2b VLP | Human | -- | HEK293 |
| CCR-HM02B | CCR2b VLP | Human | -- | HEK293 |
| CR4-HM1N122 | FITC-equivalent CCR4 Nanodisc | Human | C-His | HEK293 |
| CCR-HM107 | CCR7 Nanodisc | Human | C-His | HEK293 |
| CD33-HM1N144 | CD133 Nanodisc | Human | C-His | HEK293 |
| CD2-HM122 | CD20 VLP | Human | -- | HEK293 |
| CD2-HM1N37 | CD20 Nanodisc Nanodisc | Human | C-His | HEK293 |
| CD2-CM124V | CD24 VLP | Cynomolgus | -- | HEK293 |
| CD2-HM124V | CD24 VLP | Human | -- | HEK293 |
| CLD-HM40NB | Biotinylated Claudin 18.2 Nanodisc | Human | N-His,C-Avi | HEK293 |
| CLD-HE1822B | Biotinylated Claudin 18.2 VLP | Human | -- | HEK293 |
| CLD-HM182FB | FITC-equivalent Biotinylated Claudin 18.2 VLP | Human | -- | HEK293 |
| CLD-HM10N | FITC-equivalent Claudin 18.2 Nanodisc | Human | N-His | HEK293 |
| CLD-HM0P9 | FITC-equivalent Claudin 18.2 VLP | Human | -- | HEK293 |
| CLD-HE1822 | Claudin 18.2 VLP | Human | -- | HEK293 |
| CLD-HM006B | Biotinylated Claudin 6 VLP | Human | -- | HEK293 |
| CLD-CM006 | Claudin 6 VLP | Cynomolgus | -- | HEK293 |
| CLD-HM006 | Claudin 6 VLP | Human | -- | HEK293 |
| CLD-MM006 | Claudin 6 VLP | Mouse | -- | HEK293 |
| CLD-HM009 | Claudin 9 VLP | Human | -- | HEK293 |
| GPC-HM003 | GPC3 (438-554) VLP | Human | -- | HEK293 |
| GPC-HE005 | GPC3 VLP | Human | -- | E.coli |
| GPR-HM45PB | Biotinylated GPRC5D Nanodisc | Human | C-His-Avi | HEK293 |
| GPR-HM05PB | Biotinylated GPRC5D VLP | Human | -- | HEK293 |
| GPR-HM15P | GPRC5D Nanodisc | Human | C-His | HEK293 |
| GPR-HM05P | GPRC5D VLP | Human | -- | HEK293 |
| GPR-CM05P | GPRC5D VLP | Cynomolgus | -- | HEK293 |
| GPR-MM05P | GPRC5D VLP | Mouse | -- | HEK293 |
| LGR-HM10N | LGR-4 Nanodisc | Human | C-His | HEK293 |
| MR2-HM1N118 | MRGPRX2 Nanodisc | Human | C-His | HEK293 |
| SL7-HM0P29 | FITC-equivalent SLC7A1 VLP | Human | -- | HEK293 |
| STR-HM1N1 | SSTR2 Nanodisc | Human | C-His | HEK293 |
| STR-HM002 | SSTR2 VLP | Human | -- | HEK293 |
| TSF-HM00N | TM4SF1 Nanodisc | Human | N-His | HEK293 |
| TSF-HM002 | TM4SF1 VLP | Human | -- | HEK293 |
| GPR-HM05CB | Biotinylated VLP Control | N/A | -- | HEK293 |
| CON-HM0P34 | FITC-equivalent VLP Control | N/A | -- | HEK293 |
| VLP-HM00C | VLP Control | N/A | -- | HEK293 |

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