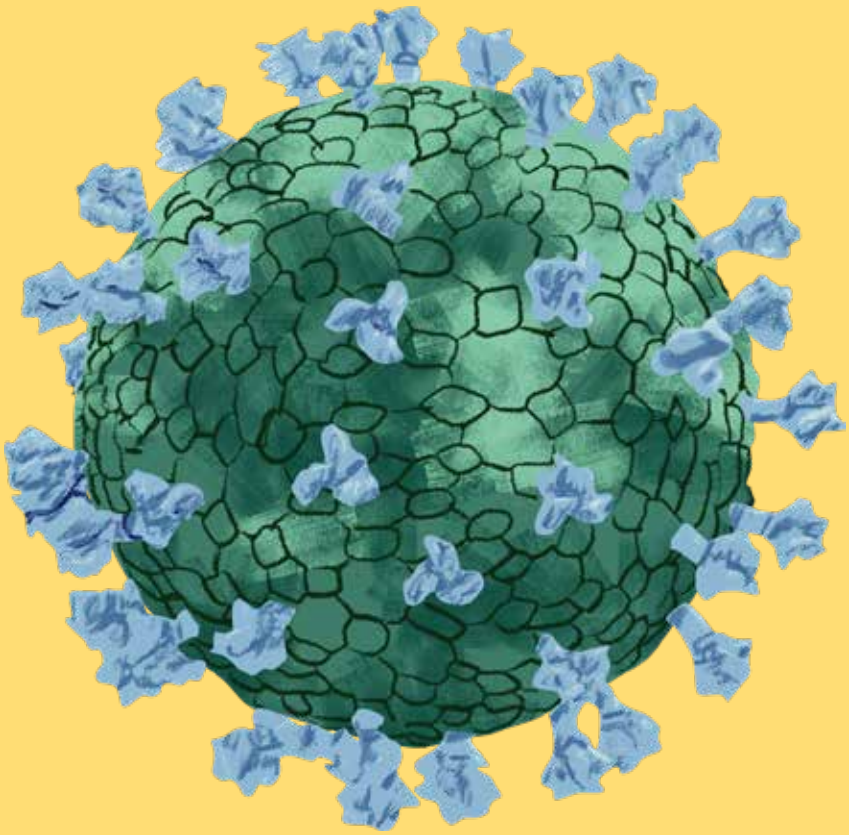
KACTUS

VLP & Nanodisc Displayed Antigens

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



kactusbio.com
support@kactusbio.us

60 Hickory Drive
Waltham, MA 02451
United States

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.

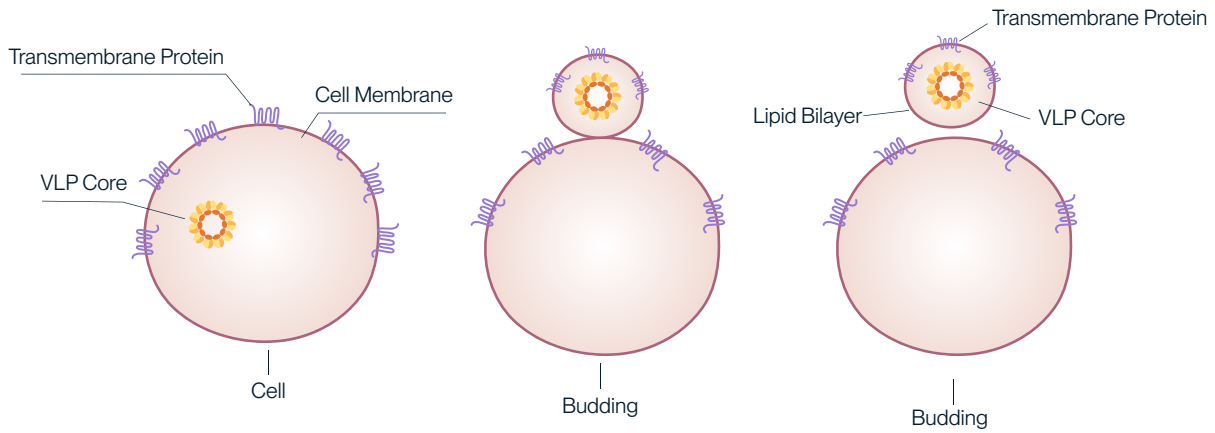


Figure 1. *How the VLP displays multi-transmembrane proteins.*

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.

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

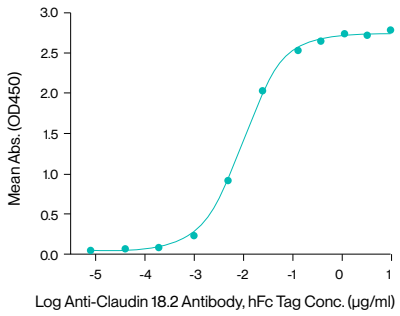


Figure 2. *ELISA data confirms that Human Claudin 18.2 VLP can bind to Anti-Claudin 18.2 antibody with an EC50 value of 9.8ng/mL.*

Catalog No. *CLD-HE1822*

SPR | Biotinylated Claudin 18.2 VLP

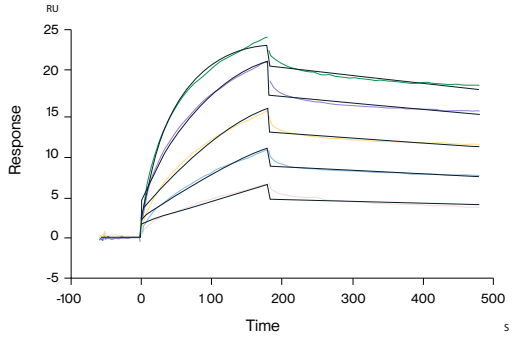


Figure 3. *SPR data confirms that Biotinylated Human Claudin 18.2 VLP can specifically bind to Anti-Claudin 18.2 antibody with an affinity constant of 1.28 nM.*

Catalog No. *CLD-HE1822B*

BLI | Biotinylated Claudin 18.2 VLP

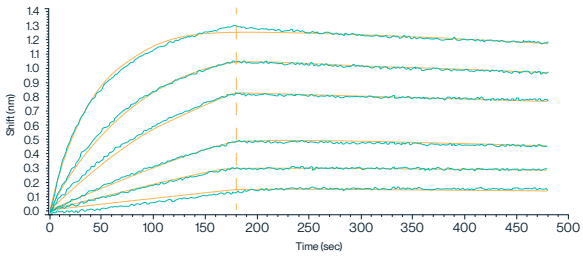


Figure 4. *BLI data demonstrates high binding affinity (KD=5.73E-10 M) of Biotinylated Human Claudin 18.2 VLPs to streptavidin-labeled probes.*

Catalog No. *CLD-HE1822B*

SPR | Biotinylated GPRC5D VLP

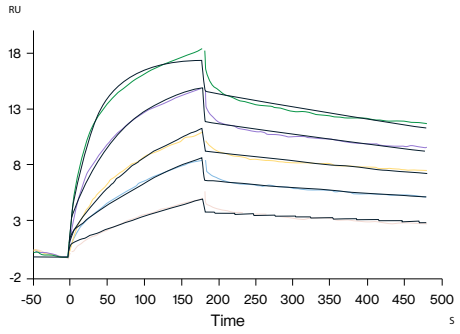


Figure 5. *SPR data confirms that Biotinylated Human GPRC5D VLP can specifically bind to Anti-GPRC5D antibody with an affinity constant of 0.30 nM.*

Catalog No. *GPR-HM05PB*

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.

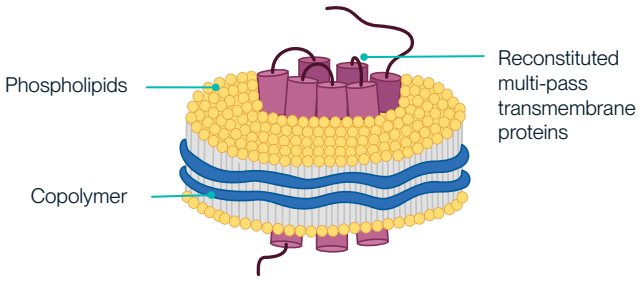


Figure 6. *Schematic diagram of a copolymer nanodisc displaying a multi-transmembrane protein.*

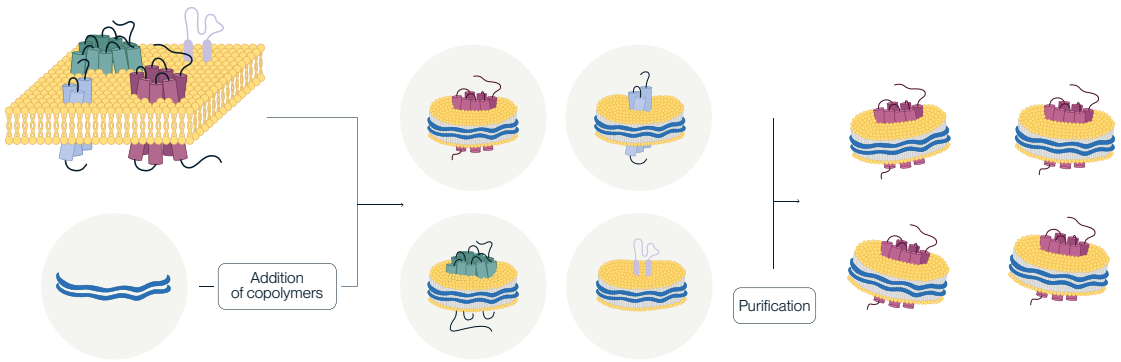


Figure 7. *Schematic diagram of copolymer nanodisc expression and purification.*

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

Nanodisc | Applications

Antibody Panning

In vitro Pharmacokinetic Studies

Antibody Screening

ELISA, SPR, BLI and other analytical tests

Nanodisc | Product Performance Validation

ELISA | GPRC5D Nanodisc

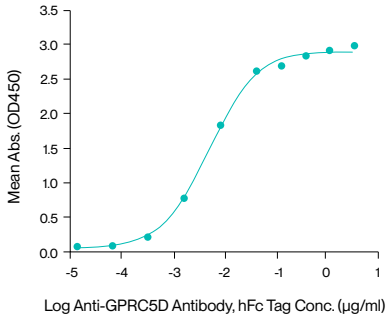


Figure 8. *ELISA data demonstrates Human GPRC5D Nanodisc can bind to Anti-GPRC5D antibody with an EC50 of 4.9ng/mL.*

Catalog No. *GPR-HM15P*

ELISA | Biotinylated GPRC5D Nanodisc

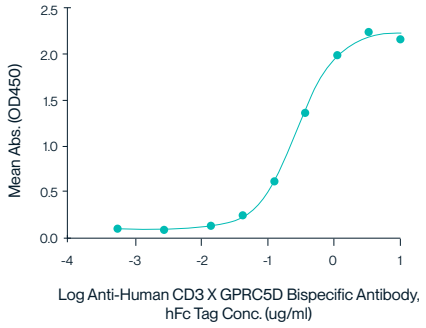


Figure 9. *Human CD3E&CD3D was immobilized on the plate, followed by Anti-Human CD3×GPRC5D Bispecific Antibody binding, followed by Biotinylated Human GPRC5D Nanodisc. Results demonstrate quality performance in ELISA to of the nanodisc to Anti-Human CD3×GPRC5D bispecific antibody with an EC50 of 0.28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

Catalog No. *GPR-HM45PB*

BLI | Biotinylated GPRC5D Nanodisc

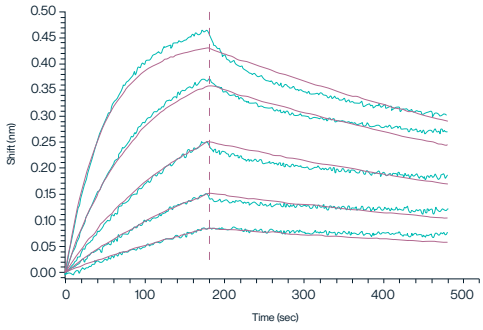


Figure 10. *BLI data demonstrates Biotinylated Human GPRC5D Nanodisc can bind to Anti-GPRC5D Antibody with high affinity (KD=1.16nM).*

Catalog No. *GPR-HM45PB*

SPR | GPRC5D Nanodisc

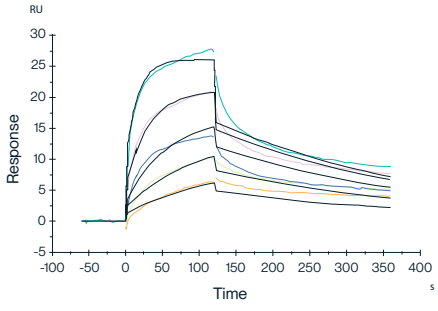
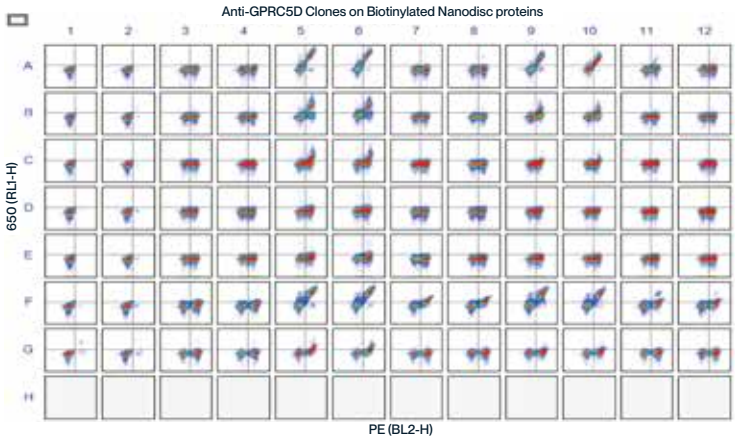


Figure 11. *SPR data demonstrates Human GPRC5D Nanodisc can bind to Anti-GPRC5D Antibody with a high affinity (KD = 1.47nm).*

Catalog No. *GPR-HM15P*

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.



Row	mAb-displayed on yeast
A	Rabbit Anti-GPRC5D Clone 1 Fab
B	Rabbit Anti-GPRC5D Clone 2 Fab
C	Rabbit Anti-GPRC5D Clone 3 Fab
D	Rabbit Anti-Negative Control 1 Fab
E	Rabbit Anti-Negative Control 2 Fab
F	Human Anti-GPRC5D Clone 4 scFv
G	Human Anti-GPRC5D Clone 5 scFv

Column	Antigen (in duplicates)
1-2	Unstained
3-4	Display and Secondary Detection Only
5-6	100 nM Biotinylated GPRC5D Nanodisc
7-8	100 nM Biotinylated Negative Control Nanodisc
9-10	25 nM Biotinylated GPRC5D Nanodisc
11-12	25 nM Biotinylated Negative Control Nanodisc

650: Streptavidin-APC
PE: PE Anti-IgG

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.

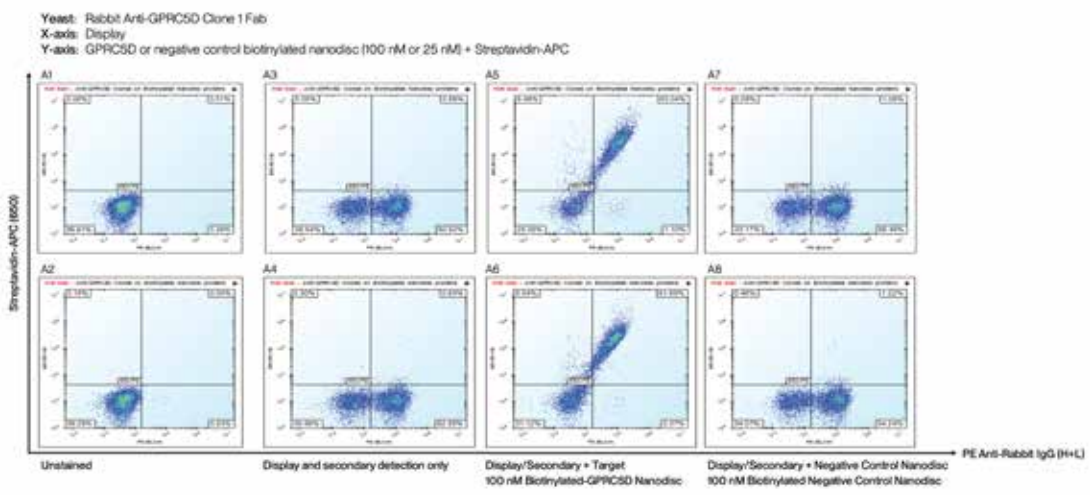


Figure 13. Biotinylated GPRC5D Nanodisc binding Rabbit Anti-GPRC5D Clone 1 Fab. Results show Rabbit Anti-GPRC5D Clone 1 Fab displayed on yeast cells binds with high specificity to Biotinylated GPRC5D Nanodisc.

See the full case study:

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 (0.5µg).

Contact us at support@kactusbio.us to request the full case study.

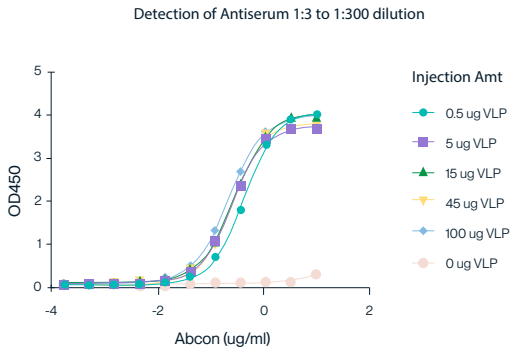


Figure 14. *An immunization dose-range study showing as low as 0.5µg VLP can produce a strong immune response.*

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			

Request Custom VLP & Nanodisc Services

To request custom VLPs or Nanodiscs, contact us at support@kactusbio.us

Ordering Information

Catalog No.	Product	Species	Tag	Expression 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-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-HM0P37	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

Contact Information

Contact us at support@kactusbio.us to request more information, speak to a sales representative, request a quote, or with help placing an order.

EMAIL

support@kactusbio.us

WEBSITE

kactusbio.com

ADDRESS

60 Hickory Drive
Waltham, MA 02451

Learn more & order online: