



CAR-T CELL TOOLS

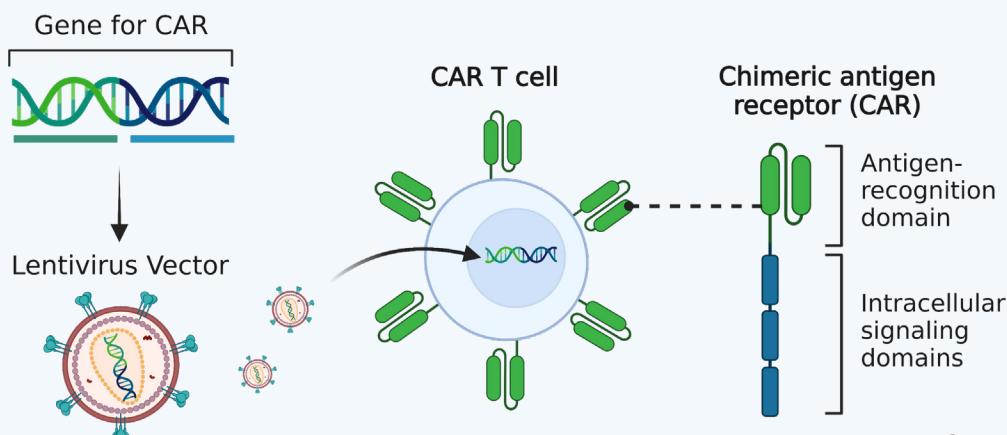
FOR ENGINEERING THE IMMUNE SYSTEM

Cell Lines | Primary Cells | Proteins | Antibodies | Viruses | Services



Engineering Effective CAR-T Cells

The development of Chimeric Antigen Receptor (CAR)-expressing T cells has made significant progress in the treatment of some types of cancer, with potential for applications in transplantation and chronic inflammation as well. More work is required to improve and expand therapies, and to limit harmful side-effects. The future is bright for CAR-T research, and BPS Bioscience continues to develop unique cell lines and other tools to help researchers create, evaluate, and enhance CAR-T cells for the improvement of human health.



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Our Advantages



Produced In-House

- Made in the USA at our San Diego, CA laboratory
- Experience customized, personal support directly from our scientists



Committed to Excellence

- ISO 9001:2015-certified Quality Management System
- Lot-specific quality control testing



Expansive Portfolio

- Choose from ready-to-use proteins, cell lines, primary cells, antibodies, BiTE® (Bispecific T-cell Engager) molecules, lentivirus, and AAV
- Consistently launching new and novel products to meet research needs



CAR-T Cell Service Platform

- Lentivirus vector design and construction
- Preparation and validation of functional CAR-T cells
- Cytotoxic (cell killing) assays
- Generation of BiTE® constructs and production of BiTE® molecules
- Antibody screening
- Custom cell line development

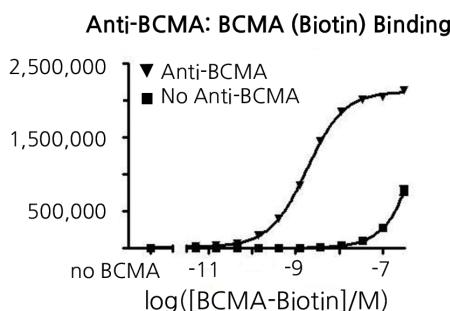
Proteins and Antibodies

● Recombinant Proteins

We specialize in the development and manufacture of bioactive enzymes and proteins, including a large selection related to CAR-T targets and T cell function. Our High-Purity (HiP™), low-aggregation protein products are optimal for generating clear and consistent research data. High purity means lower amounts of byproducts and contaminants from the manufacturing process and higher amounts of the full, expected length protein, which enables more accurate, better-quality results. Low aggregation means improved, more precise measurements for binding studies. BPS Bioscience maintains the highest standards for protein aggregation in drug discovery research.

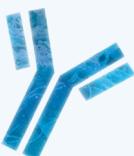


- Functional proteins for binding and blocking assays
- CAR-T target proteins
- Immune checkpoint inhibitor proteins
- Cell activating and co-stimulatory molecules
- Epitope tagged, biotin-labeled, or fluorophore-labeled



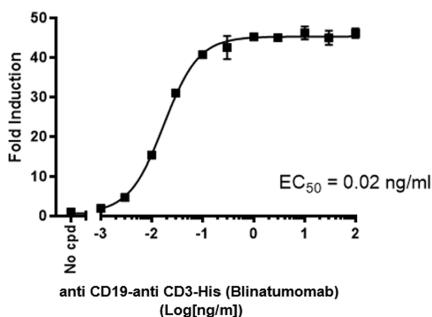
Anti-BCMA antibody (single-chain variable fragment) (#100173) was used to coat wells at 100 ng/well. Biotin-labeled BCMA recombinant protein (#79467) was titrated from 0-300 nM with a 3-fold dilution series and added to wells. Binding was detected with Streptavidin-HRP (#79742) and developed with a chemiluminescence readout.

● Antibodies



- Bispecific T cell Engager (BiTE®) molecules and trispecific antibodies, including anti-CD19-anti-CD3
- CAR-T targets, such as anti-BCMA, anti-CD19, and more
- T cell agonist antibodies, such as anti-CD3 and anti-CD28
- Recombinant production ensures consistent performance
- Human Ig isotype controls

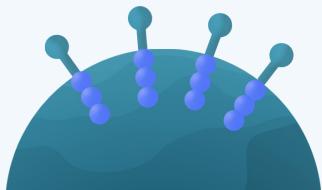
Activation of Jurkat Reporter Cells by Anti-CD19-Anti-CD3 BiTE® in Presence of CD19-positive Raji Cells



Anti-CD19-Anti-CD3 BiTE (equivalent to Blinatumomab) (#100441) was added at increasing concentrations to NFAT Reporter Luciferase Jurkat cells (#60641) in the presence of CD19-positive Raji cells. Luciferase induction was measured using the ONE-Step™ Luciferase Assay System (#60690).

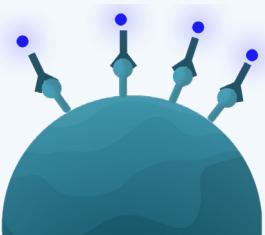
Cell Lines and Primary Cells

CAR-T Cells



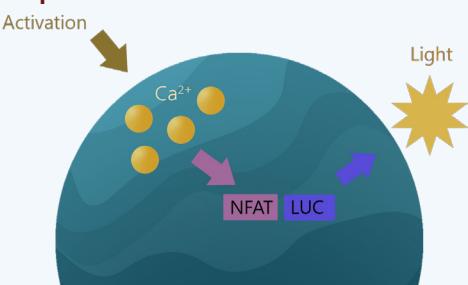
- For design of co-culture studies
- Positive controls for developing new CARs
- Cell lines and primary cells

Overexpression/Knockout Cell Lines



- Overexpressing CAR-target cell lines, including BCMA, CD19, and more
- Antibody screening and binding studies
- TCR, B2M, and CIITA knockout cell lines to model universal CAR-T cells

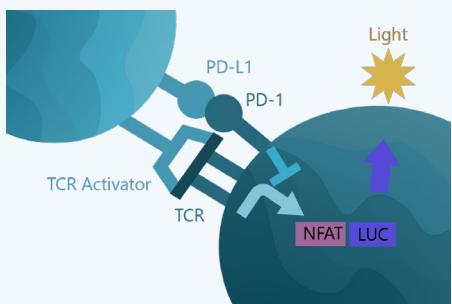
Reporter Cell Lines



Measure:

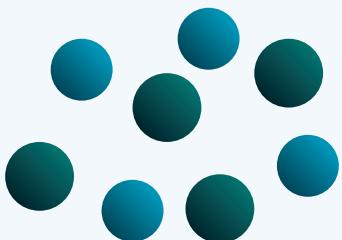
- Signaling activity
- Promoter activity
- Transcription factor activity

Co-Stimulatory Cell Lines



- Inhibitor screening
- Antibody affinity
- Co-culture studies

Primary Cells

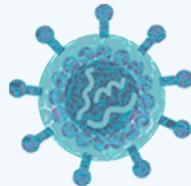


- Human CD4^+ and CD8^+ T cells, negatively selected
- Anti-BCMA and anti-CD19 CAR $\text{CD4}^+/\text{CD8}^+$ T cells
- PBMCs
- Isolated from peripheral blood of healthy donors

Lentivirus and AAV Vectors

Virus-based tools such lentiviruses and AAV are critical reagents for cell-engineering, particularly in CAR-T, gene therapy, and other personalized medicine. We have designed a suite of ready-to-use lentivirus and AAV vectors for CAR-T research and development.

Lentiviruses

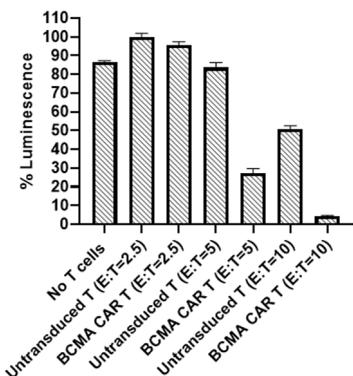


Lentiviruses are a popular tool for transducing CAR genes into primary T cells. Our replication-incompetent lentiviruses have been VSV-G pseudotyped, making these virus particles safe, stable and especially useful to target a wide range of cell types, particularly T cells in culture. Lentiviruses confer a number of advantages over other transduction methods.

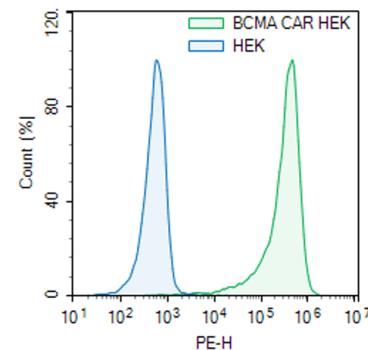
Advantages

- Can infect actively dividing and non-dividing cells
- Can infect a wide range of cell stages
- Size of inserted DNA can be up to 10 kb
- Long term stable expression of a transgene
- Low cellular toxicity
- High transduction efficiency

Anti-BCMA CAR Lentivirus (Clone C11D5.3 ScFv-CD8-4-1BB-CD3 ζ) (#78655)



Anti-BCMA CAR Lentivirus-transduced CD4+ and CD8+ T cells induce killing of Firefly Luciferase-RPMI8226 target cells.



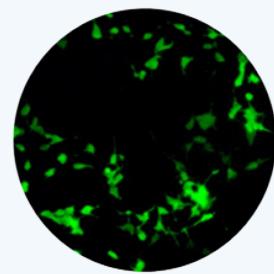
Anti-BCMA CAR Lentivirus-transduced HEK293 cells express CAR molecules that bind to biotinylated recombinant BCMA and PE-streptavidin.

AAV Reporter Vectors



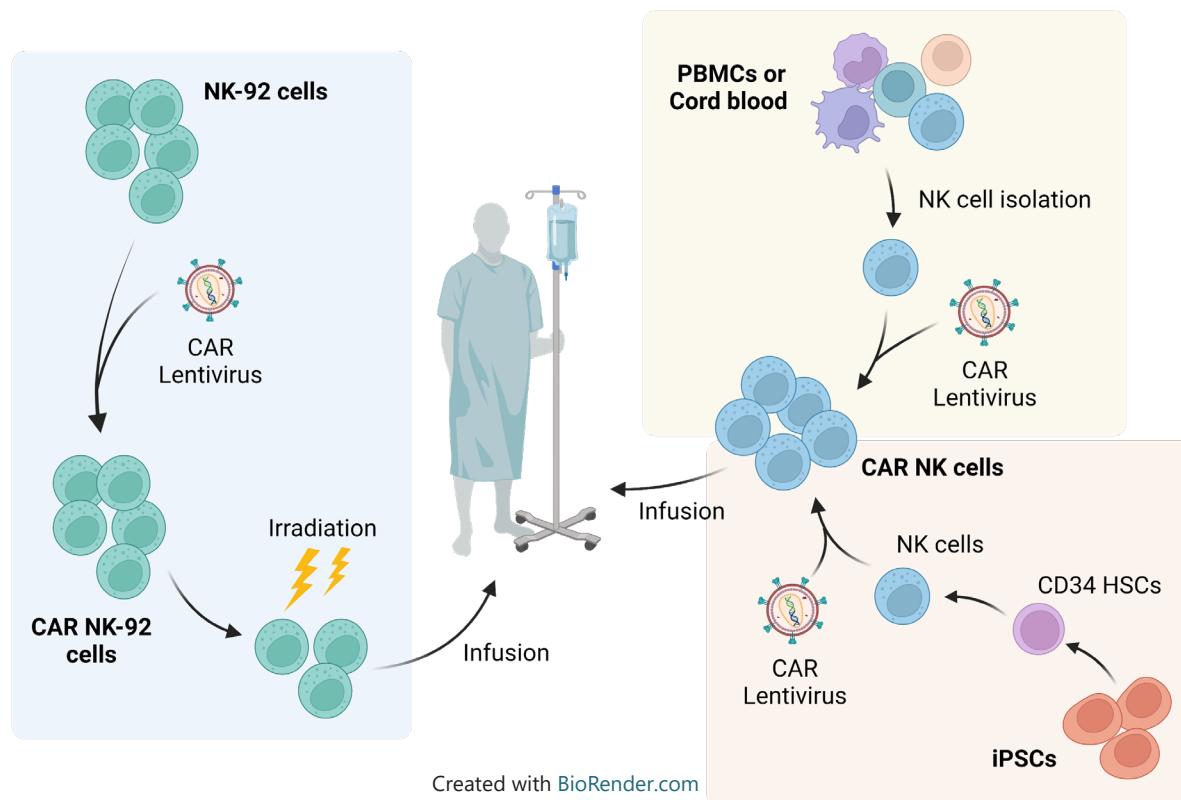
Adeno-Associated Virus (AAV) is a small non-enveloped dependovirus consisting of an icosahedral capsid containing a short, single-stranded DNA genome. Demonstrated as being safe for use in humans, AAV has been used for gene therapy to engineer cells using the viral genome to deliver the gene of interest.

We offer a growing line of AAV reporter vectors, such as luciferase or fluorescent markers for use as transduction controls, to track transgene expression over time, or for optimization of transduction and experimental conditions.



CAR-NK Cell-Related Products

Engineered CAR-NK cells are the next generation in CAR-expressing cell therapies. CAR-NK cells deliver a number of advantages over the existing CAR-T cell therapy, including fewer, less harmful side-effects, high feasibility for off-the-shelf manufacturing, which improves on delivery times, multiple mechanisms for activating cytotoxicity, and potential to be derived from multiple cell sources.



NK-92 Cells

- Firefly Luciferase (#78400) or eGFP (#78399) constitutive expression
- Useful for NK cell killing assay controls or as a platform for CAR-NK cells

Recombinant Proteins

- CD16A
- CD38
- KIR2DL1
- KIR2DL2
- KIR3DS1
- NKG2A
- NKG2D
- Nkp46
- Functional proteins for binding, blocking, and enzymatic assays
- Epitope tagged, Fc-fusion, or biotin-labeled
- Bulk production and customization

Recombinant Cell Lines

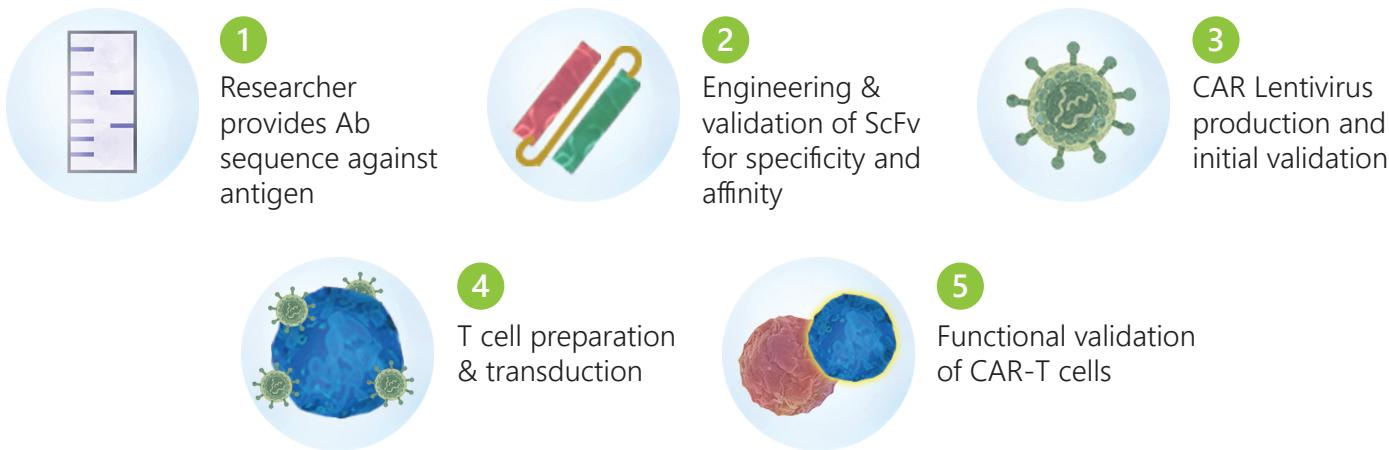
- IL-15 Responsive Luciferase Reporter Cell Line (#78402)
- KIR3DL3/IL-2 Luciferase Reporter Jurkat Cell Line (#78322)
- FcGR3A (CD16A) CHO Cell Line (#78332)

Lentiviruses

- Ideal for introducing transgenes into primary cells
- Stable integration for long term expression
- Custom production available

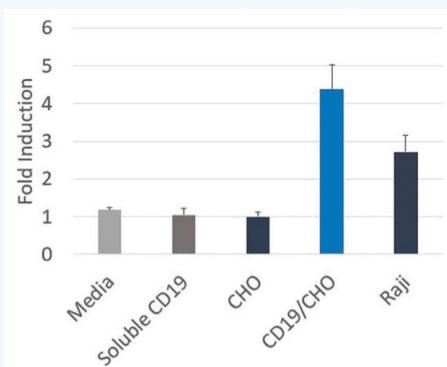
Custom CAR-T Cells

BPS Bioscience provides full service production of CAR-T cells to your desired specifications. With our milestone-measured process, you can monitor your steps to successful custom CAR-T cell generation.



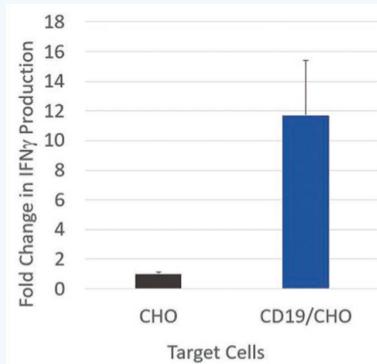
● Functional Validation

Primary Screening & Verification of CAR Activity Using a Reporter Cell Line



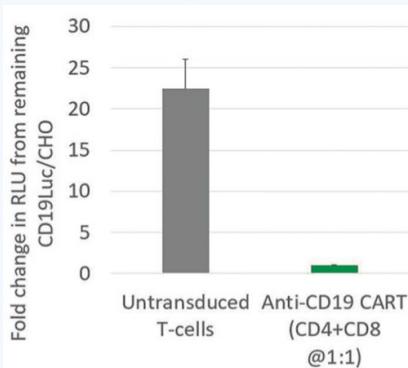
Luciferase activity in a stable cell pool of anti-CD19 CAR-expressing NFAT luciferase Jurkat cells co-cultured with the indicated targets and controls.

IFN γ Cytokine Detection from Activated CAR-T Cells



IFN γ production from Anti-CD19 CAR-T cells induced by CD19-expressing CHO cells (effector:target = 10:1). IFN γ was measured by ELISA (#79777).

Target Cell Killing Assays



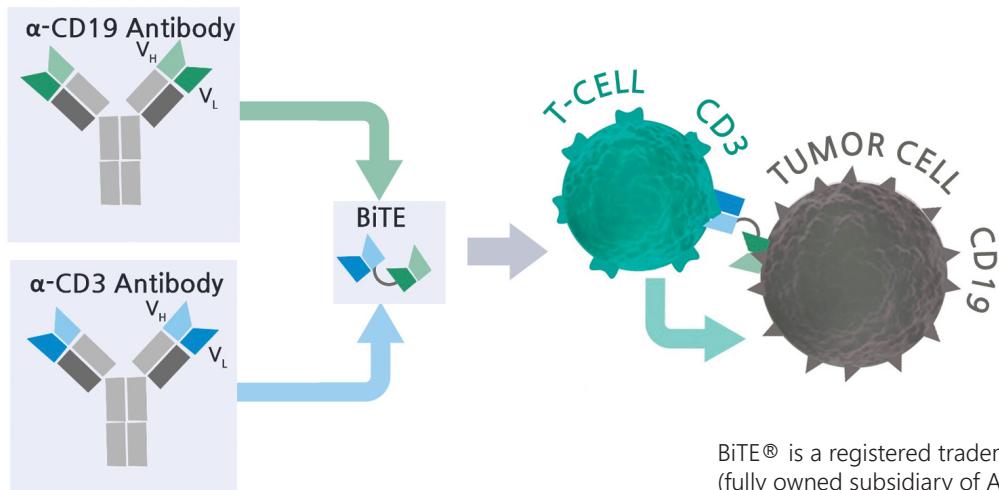
CD19 Luciferase CHO cells (79714) were targeted and killed by anti-CD19 CAR-T cells (effector:target = 10:1).

Additional Assays

- Flow cytometry to confirm CAR expression
- Mycoplasma testing

BiTE Molecules & Services

Bispecific T cell Engager (BiTE®) molecules are bivalent structures derived from two distinct antibodies designed as an immune-based therapeutic, by simultaneously engaging CD3 on T cells and a tumor-associated antigen expressed on cancer cells. This cell-to-cell ligation enables T cell targeting and killing of the tumor cells.



BiTE® is a registered trademark of Micromet AG
(fully owned subsidiary of Amgen Inc.)

● Our Capabilities

- Designing and generating BiTE constructs and producing BiTE molecules
- Measuring the affinity of BiTE binding to antigen targets using interferometry (Gator™, Probe Life) or ELISA-based assay
- Assessing T cell activation using reporter cell-based assays and measuring of K_d values using in vitro assay kits
- Evaluating bispecific constructs in reporter cell-based assays using our selection of over 100 antigen-expressing cancer cell lines

● Comparing CAR-T vs BiTE Therapy



CAR-T

- Ex vivo engineered T cells derived from patients, complex production
- Indicated for hematologic cancers
- MHC/TCR-independent, independent of endogenous T cell populations, long lasting
- Lacks efficacy against solid tumors, antigen expression-dependent



BiTE

- In vitro engineered protein, not patient derived, relatively easy production
- Useful for hematologic cancers with potential for solid tumors
- MHC/TCR-independent, dependent on endogenous T cell populations
- Antigen-dependent, requires continuous/repeated administration due to short half-life

Antibodies	Catalog#	Biochemical Assay Kits	Catalog#
Anti-BCMA Antibody	101219	CD38 Inhibitor Screening Assay Kit (Hydrolase Activity)	79672
Anti-BCMA Antibody (Single-Chain Variable Fragment), His-Tag	100173	CD47:SIRP- α [Biotinylated] Inhibitor Screening Assay Kit	72044
Anti-BCMA-Anti-CD19-Anti-CD3 Trispecific Molecule	100761	CD47:SIRP- γ [Biotinylated] Inhibitor Screening Assay Kit	72059
Anti-BCMA-Anti-CD3 Bispecific Molecule	100689		
Anti-BCMA-Anti-CD3 IgG Bispecific Antibody	101968	Cell Isolation Kits/Components	
Anti-CD19 Antibody, FITC-Labeled	101863	CD19 Positive Cell Isolation Kit	78564
Anti-CD19 IgG Antibody	100981	Cell Lines	
Anti-CD19 IgG Antibody, Biotin-Labeled	101093	Anti-BCMA CAR /NFAT (Luciferase) Reporter Jurkat Cell Line	79694
Anti-CD19-Anti-CD3 Bispecific Molecule	100441	Anti-CD19 CAR / NFAT (Luciferase) Reporter Jurkat Cell Line (CD19 SCFV-CD28-4-1BB-CD3 ζ)	79853
Anti-CD19-Anti-CD3 IgG format Bispecific Antibody	101076	Anti-CD19 CAR Negative Control/NFAT (Luciferase) Reporter Jurkat Cell Line (CD19 SCFV-CD28 Transmembrane Motif)	79854
Anti-CD20 Antibody, FITC-Labeled	101864	B2M Knockout Jurkat Cell Line	78342
Anti-CD20 Antibody, PE-Labeled	101672	B2M Knockout NFAT Luciferase Reporter Jurkat Cell Line	78363
Anti-CD20 Functional Antibody	71209	B2M Knockout THP-1 Cell Line	78389
Anti-CD20 IgG Antibody, Biotin-labeled	101207	B2M/CIITA Double Knockout THP-1 Cell Line	78391
Anti-CD20-Anti-CD3 Bispecific Antibody	100836	BCMA / CD20 / Firefly Luciferase CHO Cell Line	78185
Anti-CD20-Anti-CD3 IgM format Bispecific Antibody	100860	BCMA / GLuc - CHO Recombinant Cell Line	79830
Anti-Claudin-18 Isoform 2 Antibody, FITC-Labeled	101866	BCMA / Luciferase - CHO Recombinant Cell Line	79724
Anti-Claudin-18 Isoform 2 Antibody, PE-Labeled	101676	BCMA / NF- κ B - Reporter HEK293 Recombinant Cell Line	79755
Anti-Claudin-18 Isoform 2 IgG Antibody	101564	BCMA CHO Recombinant Cell Line (High or Low Expression)	79500
Anti-Claudin-18 Isoform 2 IgG Antibody, Biotin-Labeled	101565	CD19 / BCMA / Firefly Luciferase - CHO Recombinant Cell Line	78030
Anti-Claudin-18 Isoform2-Anti-CD3 IgG Bispecific Antibody	101541	CD19 / CD20 / Firefly Luciferase CHO Cell Line	78186
Anti-IL-2RA (CD25) Antagonist Antibody	101593	CD19 / Firefly Luciferase - CHO Recombinant Cell Line	79714
Anti-PSMA Antibody	101695	CD19 CHO Recombinant Cell Line (Low, Medium and High Expression)	79561
Anti-PSMA, Biotin Label Antibody	101757	CD20 CHO Recombinant Cell Line (High or Medium Expression)	79624
Anti-PSMA-Anti-CD3 IgG format Bispecific Antibody	101242	CD20/Firefly Luciferase CHO Cell Line	78620
		CD22 / Luciferase - CHO Recombinant Cell Line	79715
		CD22 CHO Recombinant Cell Line (Medium and High Expression)	79557
		CD38 / BCMA / Firefly Luciferase CHO Recombinant Cell Line	78148
		CD38 / CD19 / Firefly Luciferase CHO Recombinant Cell Line	78149
		CD38 CHO Recombinant Cell Line (High, Medium or Low Expression)	79615
		CD47 - HEK293 Cell Line	71249
		CD7 CHO Cell Line (Medium or High Expression)	78324
		CD8+ TCR Knockout NFAT-Luciferase Reporter Jurkat Cell Line	78757
		CIITA Knockout THP-1 Cell Line	78390

Cell Lines, Lentiviruses, Peptides, Primary Cells, Proteins | Product Listing

Cell Lines	Catalog #	Lentiviruses	Catalog #
Claudin-18 Isoform 1 CHO Cell Line	78361	Anti-CD20 CAR Lentivirus (Clone Leu-16 ScFv-CD8-4-1BB-CD3ζ)	78606
Claudin-18 Isoform 2 CHO Cell Line (High, Medium, or Low Expression)	78533	Anti-CD22 CAR Lentivirus (Clone m971 ScFv-CD8-4-1BB-CD3ζ)	78608
eGFP/Firefly Luciferase MIA PaCa-2 Cell Line	78766	Anti-Mesothelin CAR Lentivirus (P4 ScFv-CD8-4-1BB-CD3ζ)	78703
eGFP/Firefly Luciferase Ramos (RA 1) Cell Line	82149	B2M (Human) CRISPR/Cas9 Lentivirus (Integrating)	78340
FAP- CHO K1 Recombinant Cell Line (High, Medium or Low Expression)	79947	B2M (Human) CRISPR/Cas9 Lentivirus (Non-Integrating)	78341
Firefly Luciferase - CHO Recombinant Cell Line	79725	BCMA Lentivirus	78714
GPRC5D (Cynomolgus) CHO Cell Line	78338	CD47 CRISPR/Cas9 Lentivirus (Integrating)	78056
GPRC5D (Cynomolgus) HEK293 Cell Line	78346	CD47 CRISPR/Cas9 Lentivirus (Non-Integrating)	78063
GPRC5D CHO Cell Line	78337	CIITA (Human) CRISPR/Cas9 Lentivirus (Integrating)	78435
GPRC5D HEK293 Cell Line	78345	CIITA (Human) CRISPR/Cas9 Lentivirus (Non-integrating)	78434
HER2 (ERBB2) CHO Recombinant Cell Line (High, Medium, or Low Expression)	79612	GPRC5D Lentivirus	78716
Human Mesothelin - CHO-K1 Recombinant Cell Line	78132	GPRC5D Lentivirus (Macaca fascicularis/Cynomolgus)	78780
IL-2 Luciferase Reporter Jurkat Cell Line	60481	MART-1-Specific TCR Lentivirus (Clone DMF4)	78678
MART-1 TCR (DMF4) CD8+ NFAT-Luciferase Reporter Jurkat Cell Line	78772	MART-1-Specific TCR Lentivirus (Clone DMF5)	78679
MUC16 (CA125), variant 4 (region 13785-14507) CHO Cell Line	78848	NY-ESO-1-Specific TCR Lentivirus (Clone 1G4)	78675
NY-ESO-1 TCR (1G4) CD8+ NFAT-Luciferase Reporter Jurkat Cell Line	78769	NY-ESO-1-Specific TCR Lentivirus (Clone c259)	78676
NY-ESO-1 TCR (c259) CD8+ NFAT-Luciferase Reporter Jurkat Cell Line	78771	PSMA Lentivirus	78726
PSMA (FOLH1) - CHO Recombinant Cell Line (High, Medium, or Low Expression)	79641	TCR CRISPR/Cas9 Lentivirus (Integrating)	78055
TCR Activator CHO Recombinant Cell line	60539	Trop2 Lentivirus (Macaca fascicularis/Cynomolgus)	78776
TCR Activator Raji Cell Line	60556		
TCR Activator/FcGR2B CHO Cell Line	78436		
TCR Knockout Jurkat Cell Line	78539		
TCR Knockout NFAT-Luciferase Reporter Jurkat Cell Line	78556		
TCR/B2M Knockout Jurkat Cell Line	78552		
TCR/B2M Knockout NFAT Luciferase Reporter Jurkat Cell Line	78557		
TROP2 - CHO-K1 Recombinant Cell Line	78099		
Lentiviruses	Catalog #	Peptides	Catalog #
Anti-BCMA CAR Lentivirus (Clone C11D5.3 ScFv-CD8-4-1BB-CD3ζ)	78655	MART-1 Peptide (26-35)	78759
Anti-BCMA CAR Lentivirus (VHH1/VHH2 ScFv-CD8-4-1BB-CD3ζ)	78783	MART-1 Peptide (26-35, Leu27)	78760
Anti-CD19 CAR Lentivirus (CD19 ScFv-CD8-4-1BB-CD3ζ)	78600	MART-1 Peptide (27-35)	78761
Anti-CD19 CAR Lentivirus (CD19 ScFv-CD8-4-1BB-CD3ζ, eGFP)	78775	NY-ESO-1 Peptide (157-165)	78758
Anti-CD19 CAR Lentivirus (CD19 ScFv-CD8-4-1BB-CD3ζ, PuroR)	78602		
Anti-CD19 CAR Lentivirus (CD19 ScFv-CD8-4-1BB-CD3ζ; SIN Vector)	78601		
Anti-CD19/CD22 Bispecific CAR Lentivirus (Clones FMC63/m971 ScFv-CD8-4-1BB-CD3ζ)	78609		
Primary Cells	Catalog #	Proteins	Catalog #
Anti-Mesothelin CAR-T Cells	78729	BCMA, Fc-fusion (IgG1), Avi-Tag, Biotin-Labeled Recombinant	79467
Anti-BCMA CAR-T Cells	78660		
Anti-CD19 CAR-T Cells	78171		
Anti-CD20 CAR-T Cells	78611		
Untransduced T Cells	78170		
Proteins	Catalog #		

Proteins	Catalog#	Proteins	Catalog#
BCMA, Fc-Fusion, Avi-Tag Recombinant	79465	IL-2 (R58A, F62A, Y65A, E82A, C145A) (Woodchuck) Recombinant	100156
BCMA, Fc-Fusion, Avi-Tag, PE-Labeled Recombinant	100733	IL-2 (R58D, K63E, E81R, C146A) (Woodchuck) Recombinant	100157
c-Met, GST-tag Recombinant	40255	IL-2, Fc Fusion (IgG1), Avi-Tag, Biotin-Labeled Recombinant	101381
Carbonic Anhydrase 9 (CA9), His-tag Recombinant	71101	IL-2RB Recombinant (CD122) Recombinant	79655
CD19, Avi-His-Tag Recombinant	101015	IL-2RB, Avi-His-Tag Recombinant	100427
CD19, Fc-Fusion (IgG1), Avi-Tag Recombinant	79472	IL-2RG, Avi-His-Tag Recombinant	101149
CD19, Fc-Fusion (IgG1), Avi-Tag, Biotin-Labeled Recombinant	79475	IL-2RG, Avi-His-Tag, Biotin-Labeled Recombinant	101150
CD19, Fc-Fusion (IgG1), Avi-Tag, PE-labeled Recombinant	100732	IL2RB, Avi-FLAG-Tag, Biotin-Labeled HiP™ Recombinant	101314
CD20, FLAG-Tag Recombinant	101572	IL2RB, Avi-FLAG-Tag, HiP™ Recombinant	101313
CD22, Fc Fusion, Avi-Tag, PE-labeled Recombinant	101028	IL2RB, Avi-His-Tag, Biotin-Labeled Recombinant	100428
CD22, Fc-fusion, Avi-Tag HiP™ Recombinant	79464	Mesothelin, Avi-His-Tag, Biotin-Labeled, HiP™ Recombinant	100291
CD22, Fc-fusion, Avi-Tag, Biotin-labeled HiP™ Recombinant	79466	Mesothelin, Avi-His-Tag, HiP™ Recombinant	100290
CD38, Avi-His-Tag Recombinant	100346	MUC1 (CD227), Fc-Fusion (IgG1) Avi-Tag Recombinant	100073
CD38, Avi-His-Tag, Biotin-Labeled HiP™ Recombinant	100352	PSMA, His-Avi-Tag Recombinant	100463
CD38, FLAG-Tag (Pig), HiP™ Recombinant	101019	ROR1, Fc-Fusion (IgG1), Avi-Tag Recombinant	79481
CD38, His-Tag (Dog) Recombinant	100955	ROR1, Fc-Fusion (IgG1), Avi-Tag, Biotin-Labeled Recombinant	79482
CD38, His-Tag (Human), HiP™ Recombinant	71277	ROR1, GST-tag Recombinant	40396
CD38, His-Tag (Mouse), HiP™ Recombinant	79070	ROR2, Fc-Fusion (IgG1), Avi-Tag HiP™ Recombinant	100029
CD38, His-Tag, PE-labeled Recombinant	71882	ROR2, Fc-Fusion (IgG1), Avi-Tag, Biotin-Labeled HiP™ Recombinant	100046
CD38-APC, His-Tag Recombinant	71883	ROR2, GST-tag Recombinant	40296
CD47 (Monkey), Fc Fusion (Human), Avi-Tag HiP™ Recombinant	79118	Trop2 (88-274), Fc Fusion (IgG1), Avi-Tag Recombinant	101346
CD47 (Monkey), Fc Fusion (Human), Avi-Tag, Biotin HiP™ Recombinant	79302	Trop2 (88-274), Fc Fusion (IgG1), Avi-Tag, Biotin-Labeled Recombinant	101347
CD47, Fc Fusion (IgG1) Recombinant	71177	Trop2, Fc Fusion (IgG1), Avi-Tag Recombinant	101344
CD47, Fc fusion, Avi-Tag (Human) HiP™ Recombinant	79051		
CD47, Fc Fusion, Avi-Tag, Biotin-Labeled (Mouse) Recombinant	72514		
CD47, Fc fusion, Biotin-labeled (Human) HiP™ Recombinant	71169		
CD47, Fc-Fusion, Streptavidin-Labeled Recombinant	71292		
CD47, His-Tag (Human) Recombinant	71127		
Claudin-18 Isoform 2, FLAG-Tag Recombinant	101570		
EGFR, His-tag, GST-tag Recombinant	40187		
GPC3, Avi-His-Tag Recombinant	100071		
HER2, GST-Tag Recombinant	40230		
IL-12 (p40/p35) Fc Fusion (IgG1), Avi-Tag Recombinant	101431		
IL-12 (p40/p35) Fc Fusion (IgG1), Avi-Tag, Biotin-Labeled Recombinant	101432		
IL-2 (C145A) Recombinant	100159		



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Ordering Information
orders@bpsbioscience.com



Technical Support
support@bpsbioscience.com



US Sales Support
sales-team@bpsbioscience.com



International Sales Support
international@bpsbioscience.com

BPS Bioscience, Inc.
6405 Mira Mesa Blvd, Suite 100
San Diego, CA 92121
Tel: 858-202-1401

bpsbioscience.com

