

CAR-T CELL TOOLS

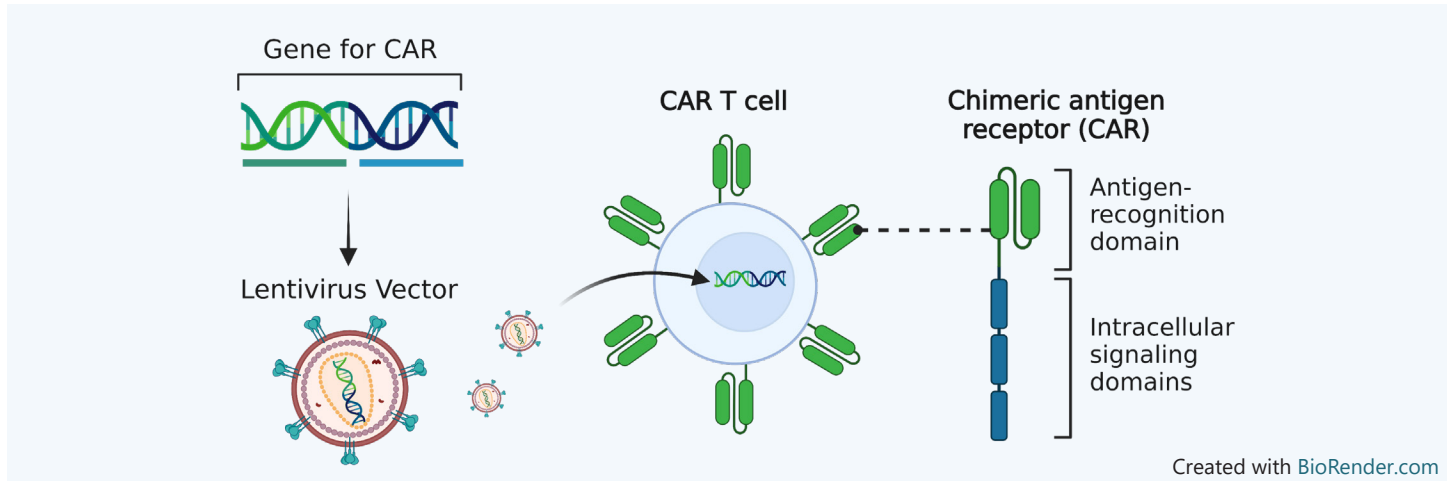
FOR ENGINEERING THE IMMUNE SYSTEM

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.



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

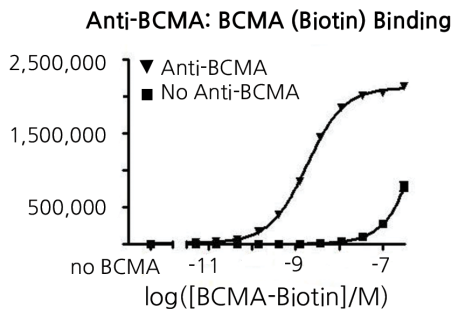
Proteins and Antibodies

● 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.

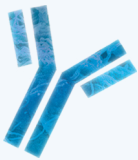


- Functional proteins for binding and blocking assays
- CAR-T target proteins
- Immune checkpoint inhibitor proteins
- Cell activating and co-stimulatory molecules
- Epitope tagged, biotin-labeled, or fluorophore-labeled



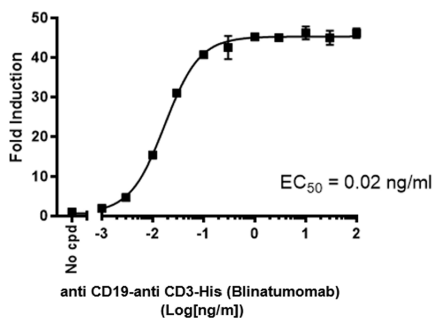
Anti-BCMA antibody (single-chain variable fragment) (#100173) was used to coat wells at 100 ng/well. Biotin-labeled BCMA recombinant protein (#79467) was titrated from 0-300 nM with a 3-fold dilution series and added to wells. Binding was detected with Streptavidin-HRP (#79742) and developed with a chemiluminescence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

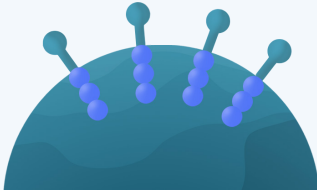
Activation of Jurkat Reporter Cells by Anti-CD19-Anti-CD3 BiTE® in Presence of CD19-positive Raji Cells



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).

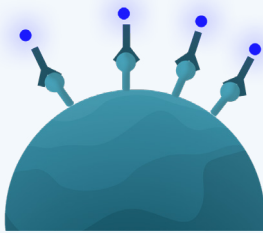
Cell Lines and Primary Cells

● CAR-T Cells



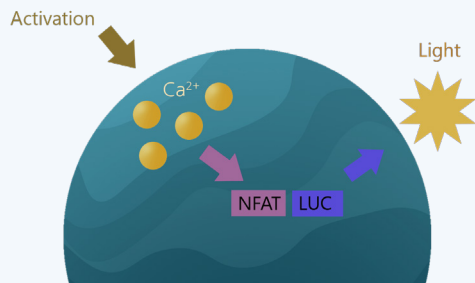
- For design of co-culture studies
- Positive controls for developing new CARs
- Cell lines and primary cells

● 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

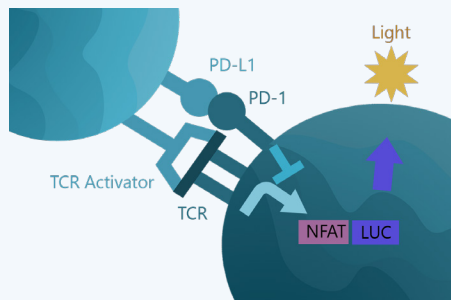
● Reporter Cell Lines



Measure:

- Signaling activity
- Promoter activity
- Transcription factor activity

● Co-Stimulatory Cell Lines



- Inhibitor screening
- Antibody affinity
- Co-culture studies

● Primary Cells

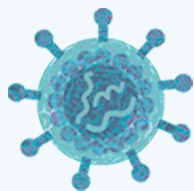


- Human CD4⁺ and CD8⁺ T cells, negatively selected
- Anti-BCMA and anti-CD19 CAR CD4⁺/CD8⁺ T cells
- PBMCs
- Isolated from peripheral blood of healthy donors

Lentivirus and AAV Vectors

Virus-based tools such as 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

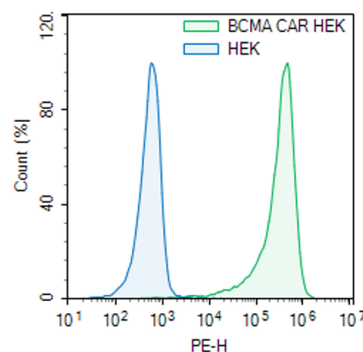
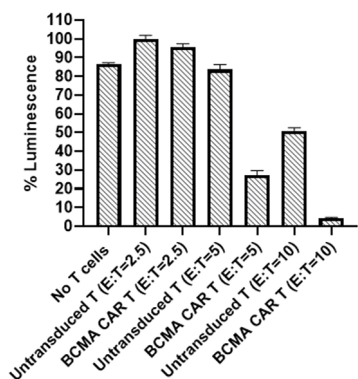


Lentiviruses are a popular tool for transducing CAR genes into primary T cells. Our replication-incompetent lentiviruses have been VSV-G pseudotyped, making these virus particles safe, stable and especially useful to target a wide range of cell types, particularly T cells in culture. Lentiviruses confer 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-CD3ζ) (#78655)



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

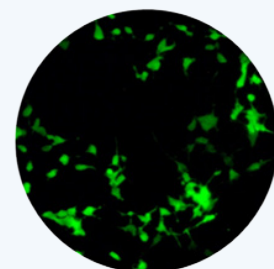
Anti-BCMA CAR Lentivirus-transduced HEK293 cells express CAR molecules that bind to biotinylated recombinant BCMA and PE-streptavidin.

AAV Reporter Vectors



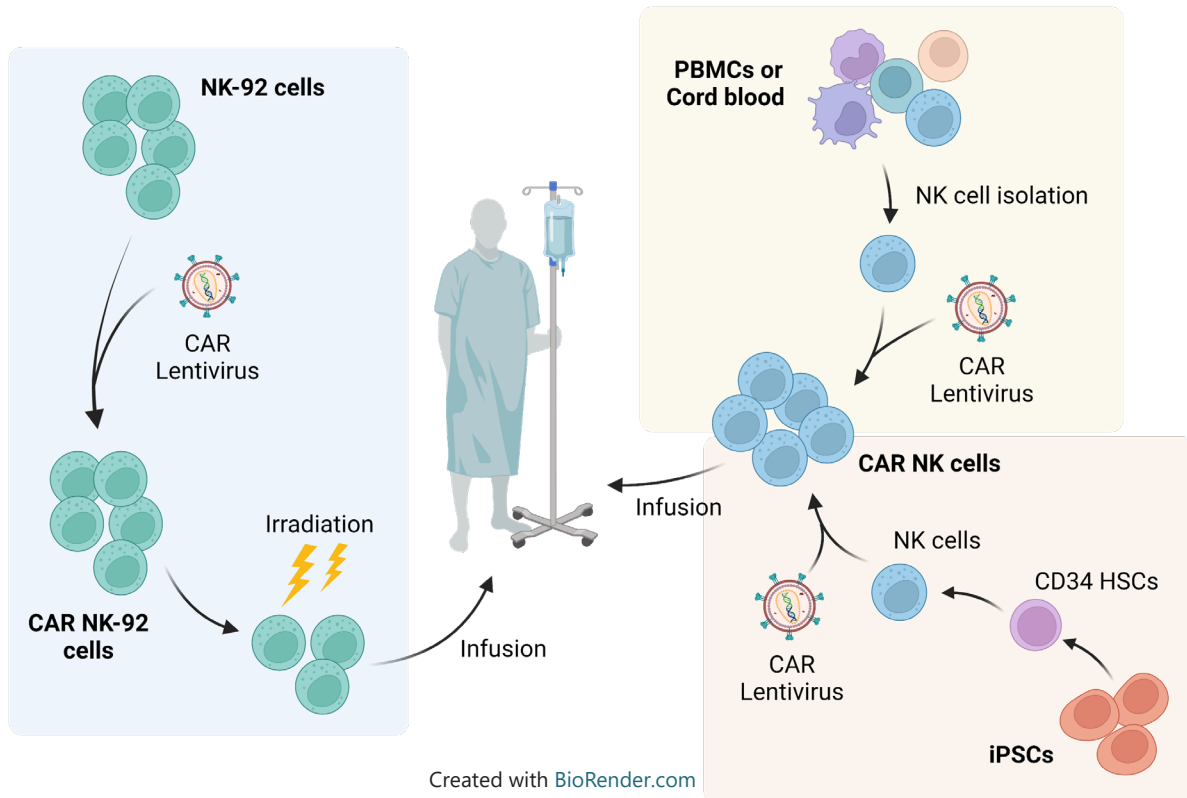
Adeno-Associated Virus (AAV) is a small non-enveloped dependovirus consisting of an icosahedral capsid containing a short, single-stranded DNA genome. Demonstrated as being safe for use in humans, AAV has been used for gene therapy to engineer cells using the viral genome to deliver the gene of interest.

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

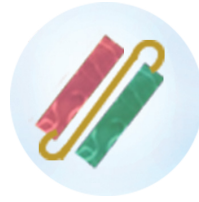
- Ideal for introducing transgenes into primary cells
- Stable integration for long term expression
- Custom production available

Custom CAR-T Cells

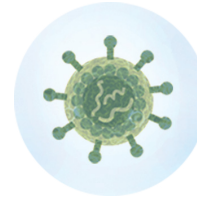
BPS Bioscience provides full service production of CAR-T cells to your desired specifications. With our milestone-measured process, you can monitor your steps to successful custom CAR-T cell generation.



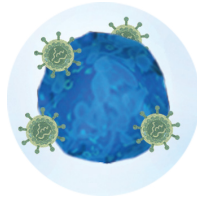
1
Researcher provides Ab sequence against antigen



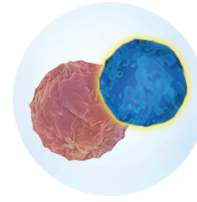
2
Engineering & validation of ScFv for specificity and affinity



3
CAR Lentivirus production and initial validation



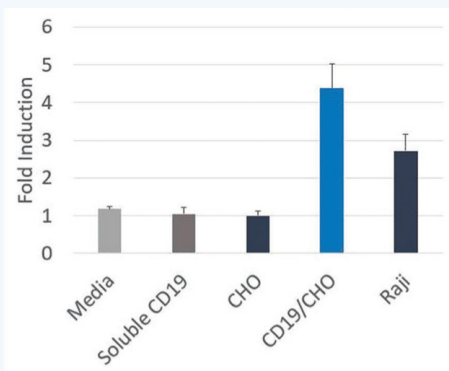
4
T cell preparation & transduction



5
Functional validation of CAR-T cells

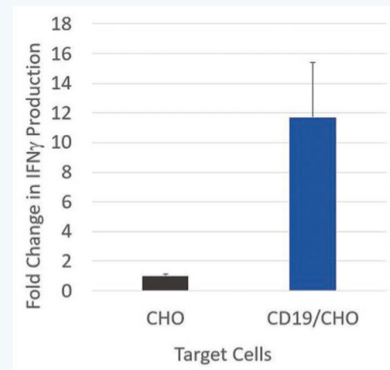
● Functional Validation

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



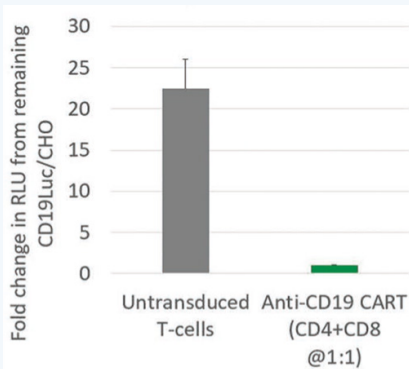
Luciferase activity in a stable cell pool of anti-CD19 CAR-expressing NFAT luciferase Jurkat cells co-cultured with the indicated targets and controls.

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



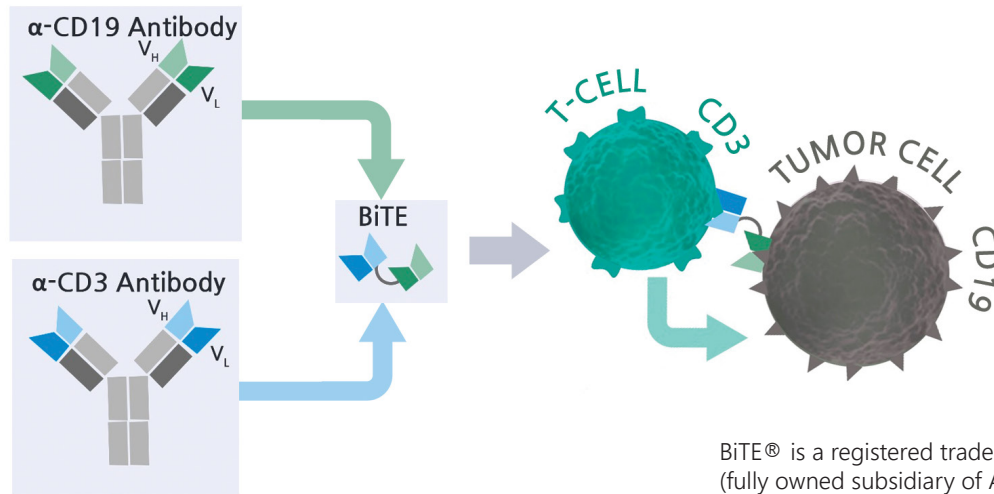
CD19 Luciferase CHO cells (79714) were targeted and killed by anti-CD19 CAR-T cells (effector:target = 10:1).

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.



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#	Proteins	Catalog#
Anti-BCMA Antibody	101219	CD38, Avi-His-Tag Recombinant	100346
Anti-BCMA Antibody (Single-Chain Variable Fragment), His-Tag	100173	CD38, Avi-His-Tag, Biotin-Labeled HiP™ Recombinant	100352
Anti-BCMA-Anti-CD19-Anti-CD3 Trispecific Molecule	100761	CD38, His-Tag (Dog) Recombinant	100955
Anti-BCMA-Anti-CD3 Bispecific Molecule	100689	CD38, His-Tag (Human), HiP™ Recombinant	71277
Anti-CD19 Antibody, FITC-Labeled	101863	CD38, His-Tag (Mouse), HiP™ Recombinant	79070
Anti-CD19-Anti-CD3 Bispecific Molecule	100441	CD38, His-Tag, PE-labeled Recombinant	71882
Anti-CD19-Anti-CD3 IgG format Bispecific Antibody	101076	CD38-APC, His-Tag Recombinant	71883
Anti-CD20-Anti-CD3 Bispecific Antibody	100836	CD70, His-Tag (Mouse) Recombinant	79066
Anti-CD28 Agonist Antibody	100182	EGFR, His-tag, GST-tag Recombinant	40187
Anti-CD28 Agonist Antibody (Humanized)	100186	GPC3, Avi-His-Tag Recombinant	100071
Anti-CD3 Agonist Antibody	71274-2	HER2, GST-Tag Recombinant	40230
Anti-CD3 Agonist Antibody	71274-1	LILRB4, Avi-His-Tag, HiP™ Recombinant	100236
Anti-Claudin-18 Isoform 2 Antibody, FITC-Labeled	101866	Mesothelin, Avi-His-Tag, Biotin-Labeled, HiP™ Recombinant	100291
Anti-PSMA-Anti-CD3 IgG format Bispecific Antibody	101242	Mesothelin, Avi-His-Tag, HiP™ Recombinant	100290
		MUC1 (CD227), Fc-Fusion (IgG1) Avi-Tag Recombinant	100073
		Nectin4, His-Avi-Tag HiP™ Recombinant	100674
		Nectin4, His-Avi-Tag, Biotin-labeled Recombinant	100675
		PD-L1 (CD274), FLAG-tag (Human) HiP™ Recombinant	71183
		PSMA, His-Avi-Tag Recombinant	100463
		PSMA, His-Avi-Tag, Biotin-Labeled Recombinant	100464
		ROR1, Fc-Fusion (IgG1), Avi-Tag Recombinant	79481
		ROR1, Fc-Fusion (IgG1), Avi-Tag, Biotin-Labeled Recombinant	79482
		ROR1, Fc-Fusion (IgG1)-Avi-Tag, PE-labeled Recombinant	100995
		ROR1, GST-tag Recombinant	40396
		ROR2, Fc-Fusion (IgG1), Avi-Tag HiP™ Recombinant	100029
		ROR2, Fc-Fusion (IgG1), Avi-Tag, Biotin-Labeled HiP™ Recombinant	100046
		ROR2, GST-tag Recombinant	40296
		Trop2 (88-274), Fc Fusion (IgG1), Avi-Tag Recombinant	101346
		Trop2 (88-274), Fc Fusion (IgG1), Avi-Tag, Biotin-Labeled Recombinant	101347
		Trop2, Fc Fusion (IgG1), Avi-Tag Recombinant	101344
Proteins	Catalog#	CAR-T Cell Lines	Catalog#
BCMA, Fc-fusion (IgG1), Avi-Tag, Biotin-Labeled Recombinant	79467	Anti-Mesothelin CAR-T Cells	78729
BCMA, Fc-Fusion, Avi-Tag Recombinant	79465	Anti-BCMA CAR /NFAT (Luciferase) Reporter Jurkat Cell Line	79694
BCMA, Fc-Fusion, Avi-Tag, PE-Labeled Recombinant	100733	Anti-CD19 CAR / NFAT (Luciferase) Reporter Jurkat Cell Line (CD19 SCFV-CD28-4-1BB-CD3ζ)	79853
c-Met, GST-tag Recombinant	40255		
Carbonic Anhydrase 9 (CA9), His-tag Recombinant	71101		
CD123, Avi-His-Tag Recombinant	101035		
CD123, Fc-Fusion (IgG1) Avi-Tag Recombinant	100058		
CD123, Fc-Fusion (IgG1) Avi-Tag, Biotin-Labeled Recombinant	100068		
CD19, Avi-His-Tag Recombinant	101015		
CD19, Fc-Fusion (IgG1), Avi-Tag Recombinant	79472		
CD19, Fc-Fusion (IgG1), Avi-Tag, Biotin-Labeled Recombinant	79475		
CD19, Fc-Fusion (IgG1), Avi-Tag, PE-labeled Recombinant	100732		
CD22, Fc Fusion, Avi-Tag, PE-labeled Recombinant	101028		
CD22, Fc-fusion, Avi-Tag HiP™ Recombinant	79464		
CD22, Fc-fusion, Avi-Tag, Biotin-labeled HiP™ Recombinant	79466		
CD30, Fc-Fusion (IgG1), Avi-Tag, Biotin-Labeled Recombinant	72511		
CD33, Fc Fusion, Avi-Tag, PE-labeled Recombinant	101029		
CD34, Avi-His-Tag HiP™ Recombinant	101190		
CD37, Avi-His-Tag, Biotin-Labeled Recombinant	101331		

Primary Cells	Catalog#
Anti-Mesothelin CAR-T Cells	78729
10x Cell Isolation Buffer	78563
Anti-BCMA CAR-T Cells	78660
Anti-CD19 CAR-T Cells	78171
Anti-CD20 CAR-T Cells	78611
CD19 Positive Cell Isolation Kit	78564
CD4+ T cells, Negatively Selected (Human)	79752
CD8+ T cells, Negatively Selected (Human)	79753
Cell Isolation Magnetic Tube Rack	78571
NCAM1/CD56 Positive Cell Isolation Kit	78808
Normal Human Peripheral Blood Mononuclear Cells, Frozen	79059
TCellIM™	78753
Untransduced T Cells	78170



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