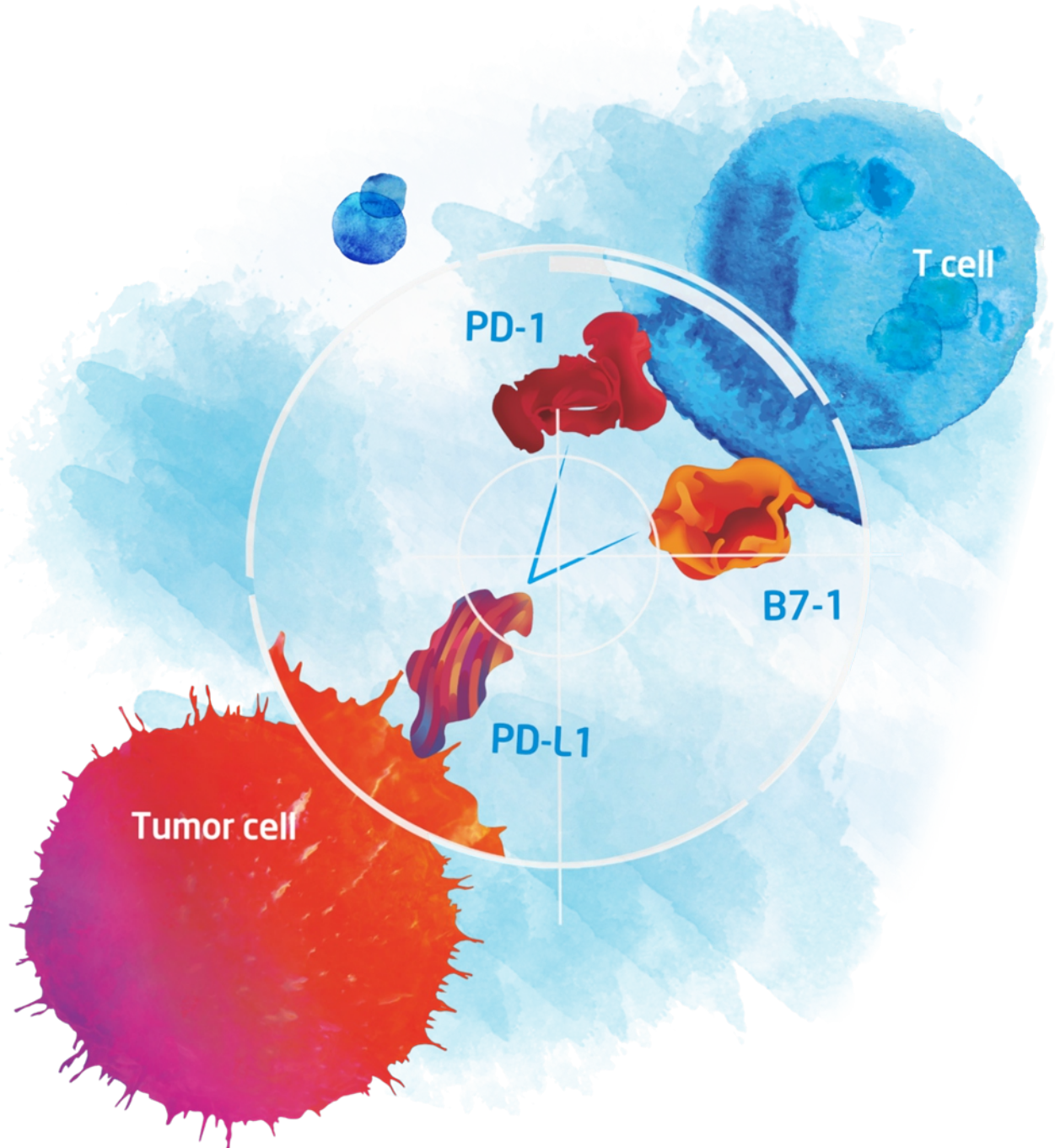


PD-1 Pathway Recombinant Protein Collection



Content

- I. Introduction
- II. Biotinylated PD-1 Pathway Proteins
 - IIa. ELISA
 - IIb. FAC Sorting
 - IIc. Biopanning
- III. HPLC-verified Proteins
- IV. Full-length PD-1 Protein
- V. FITC-labeled PD-1
- VI. Full Product List

PD-1

PD-L1

B7-1

B7-H2

PD-L2

CTLA-4

B7-H5

Introduction

Immune checkpoint pathway is a focal point of today's cancer research. PD-1 is one of the best characterized checkpoint proteins. The binding between PD-1 and its ligand PD-L1 and/or PD-L2 suppresses T-cell activation, and allows cancer cells to escape from body's immune surveillance. This mechanism prompts the idea that neutralizing PD-1 pathway may help re-engage the immune system to fight against cancer.

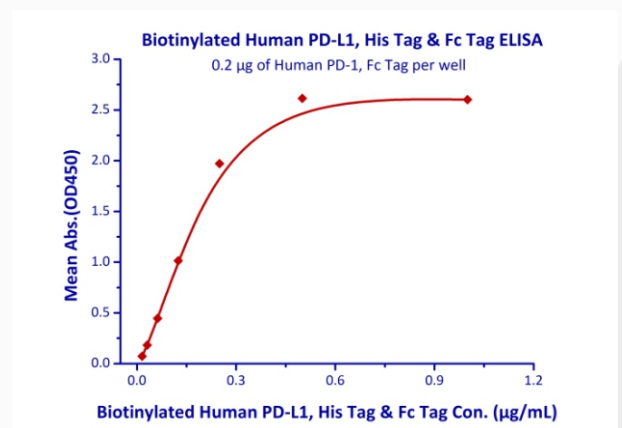
In recent years, multiple lines of anti-PD-1 drugs have been developed, and have demonstrated enormous potential in recent clinical trials. Patients with melanoma, renal cell carcinoma, non-small cell lung cancer (NSCLC), or hematological cancers all respond positively to this treatment.

ACROBiosystems provides a comprehensive series of PD-1 related products for researchers to investigate and target PD-1 pathway.

ELISA

ELISA is an assay technique routinely used to characterize protein-protein interaction. It's often used in initial high-throughput screening (HTS) of compound library.

ACROBiosystems has developed a range of pre-biotinylated PD-1 pathway proteins. Biotinylated proteins can serve as two-way antibodies for both capture and detection in ELISA assays. They demonstrate higher specificity and detection sensitivity than traditional antibodies.



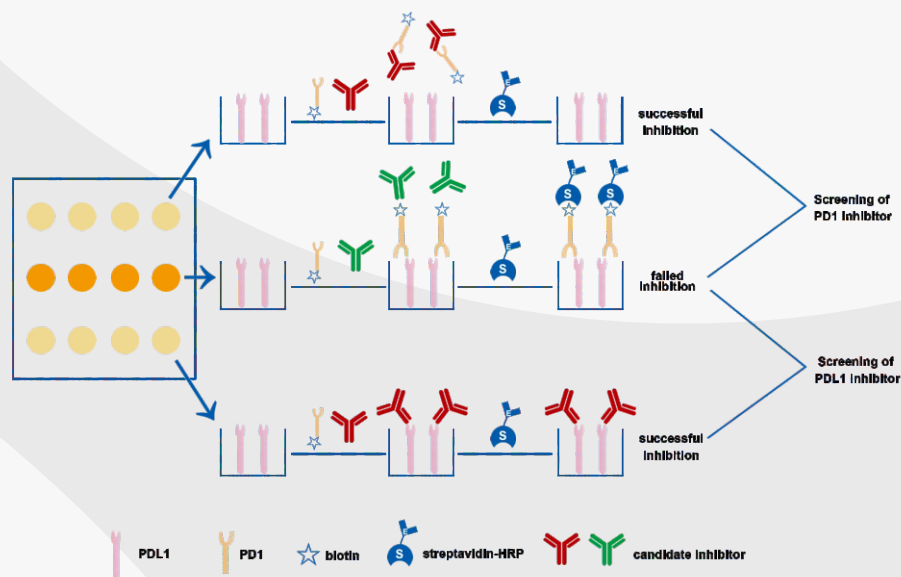
Immobilized human PD-1 (Cat. # PD1-H5257) at 2 µg/mL (100 µL/well) can bind to biotinylated human PD-L1, His & Fc tag (Cat. # PD1-H82F3) with a linear range of 0.01-0.25 µg/mL.

Molecule	Cat. No.	Product Desc.	Species	Structure	Purity	Size
PD-1	PD1-H82F2	Biotinylated Human PD-1	Human	PD-1 (25-167) Fc Avi His	>95% SDS	25ug, 200ug
PD-1	PD1-M82F4	Biotinylated Mouse PD-1	Mouse	PD-1 (25-167) Fc Avi	>92% SDS	25ug, 200ug
PD-L1	PD1-H82F3	Biotinylated Human PD-L1	Human	PD-L1 (19-238) Fc Avi His	>95% SDS	25ug, 200ug
PD-L1	PD1-M82F5	Biotinylated Mouse PD-L1	Mouse	PD-L1 (19-238) Fc Avi	>95% SDS	25ug, 200ug

Suggested Pairs

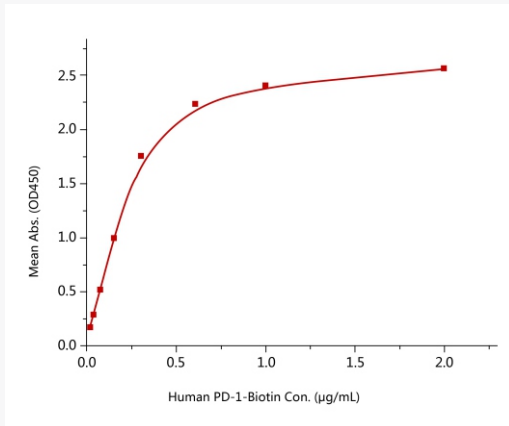
	Product Desc.	Cat. No.	Species	Structure
Pair 1	Human PD-L1 / B7-H1 Protein, Fc Tag, low endotoxin	PD1-H5258	Human	PD-L1 (19-238) Fc
	Biotinylated Human PD-1 / PDCD1, His Tag & Fc Tag, Avi Tag (Avitag™)	PD1-H82F2	Human	PD-1 (25-167) Fc Avi His
Pair 2	Mouse PD-L1 / B7-H1 Protein, Fc Tag	PD1-M5251	Mouse	PD-L1 (19-238) Fc
	Biotinylated Mouse PD-1 / PDCD1, Fc Tag, Avi Tag (Avitag™)	PD1-M82F4	Mouse	PD-1 (25-167) Fc Avi
Pair 3	Human PD-1 / PDCD1 Protein, Fc Tag (HPLC-verified), low endotoxin	PD1-H5257	Human	PD-1 (25-167) Fc
	Biotinylated Human PD-L1 / B7-H1, His Tag & Fc Tag, Avi Tag (Avitag™)	PD1-H82F3	Human	PD-L1 (19-238) Fc Avi His
Pair 4	Mouse PD-1 / PDCD1 Protein, Fc Tag	PD1-M5259	Mouse	PD-1 (25-167) Fc
	Biotinylated Mouse PD-L1 / B7-H1, Fc Tag, Avi Tag (Avitag™)	PD1-M82F5	Mouse	PD-L1 (19-238) Fc Avi

To further simplify your research, we've developed a **PD-1[Biotin]: PD-L1 Inhibitor Screening Kit (Cat. # EP-101)**. This assay employs a simple colorimetric ELISA platform, which measures the binding between immobilized human PD-L1 and in-house developed biotinylated PD-1 protein. This product is uniquely suitable for rapid and high-throughput screening of putative PD-1 and PD-L1 inhibitors.

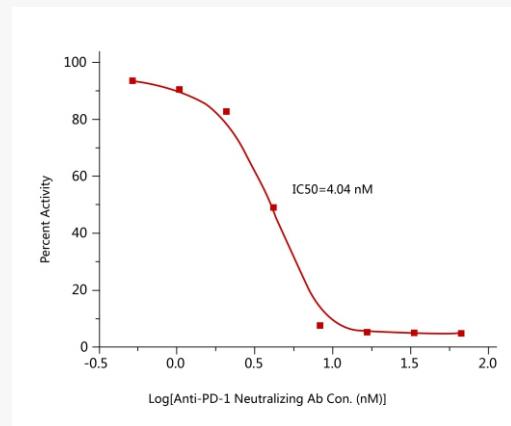


Principle of PD-1[Biotin]: PD-L1 Inhibitor Screening Kit

Molecule	Cat. No.	Product Desc.	Species	Size
PD-1 & PD-L1	EP-101	PD-1[Biotin]: PD-L1 Inhibitor Screening Pair	Human	96 tests, 480 tests

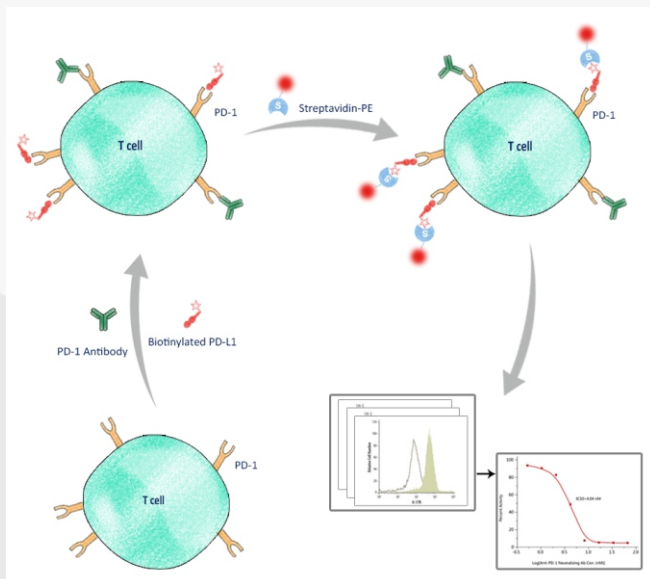


Immobilized PD-L1 at 2 µg/mL (100 µL/well) can bind biotinylated human PD-1 with a linear range of 0.038 - 0.6 µg/mL when detected by Streptavidin-HRP.



Inhibition of PD-1-PD-L1 binding by an anti-PD-1 neutralizing antibody is measured by the PD-1 [Biotinylated] : PD-L1 Inhibitor Screening ELISA Assay Pair (Cat. # EP-101).

FAC Sorting



Biotinylated PD-L1 and PD-L2 in FAC sorting

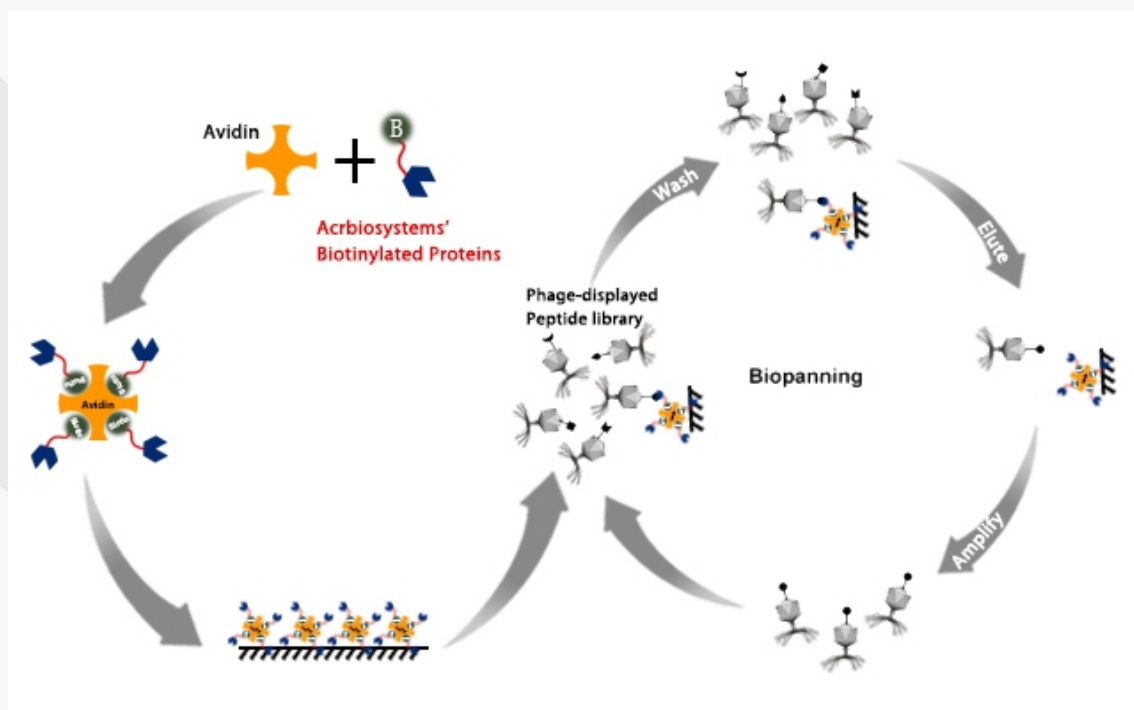
Biotinylated proteins can be used along with fluorophore-tagged SA to detect/isolate cells expressing particular surface markers. In a newly published US patent titled "ANTI-PD-1 ANTIBODIES AND METHODS OF USE THEREOF" (US patent 20160159905), the authors (from Pfizer Inc.) used ACROBiosystems' biotinylated PD-L1 (Cat. # PD1-H82F3) and biotinylated PD-L2 (Cat. # PD2-H82F6) to compete with candidate antibodies in a binding assay against PD-1 expressing cells. This assay provides measurement for the binding activity of the corresponding antibodies.

Biopanning

Biopanning has gradually become the mainstream approach for antibody development. The Avitag[®] biotinylated proteins can be used with SA-coated magnetic beads/surface in biopanning. It's a much better choice than non-biotinylated, or chemically biotinylated proteins because it offers higher coating density and uniformed antigen presentation.

Please note that the Fc tag is generally undesired for these experiments because it generates false positive results. We have developed Avitag[®] PD-1 pathway proteins with only His tag attached. These products are recommended specifically for biopanning.

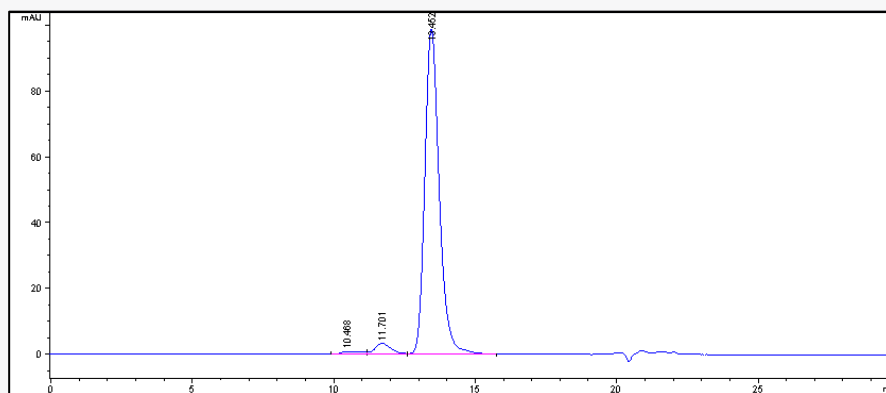
Molecule	Cat. No.	Product Desc.	Species	Structure	Purity	Size
PD-1	PD1-H82E4	Biotinylated Human PD-1	Human	PD-1 (25-167) Avi His	>95% SDS	25ug, 200ug
PD-L1	PD1-H82E5	Biotinylated Human PD-L1	Human	PD-L1 (19-238) Avi His	>95% SDS	25ug, 200ug
PD-L2	PD2-H82E8	Biotinylated Human PD-L2	Human	PD-L2 (20-219) Avi His	>95% SDS	25ug, 200ug








Biopanning Workflow with Biotinylated Proteins

HPLC-verified Proteins

The quality of recombinant proteins is essential in pharmaceutical assay development. In many situations, SDS-PAGE alone is not sufficient for quality control purposes. To address this need, ACROBiosystems has developed a collection of HPLC-verified PD-1 and PD-L1 proteins.



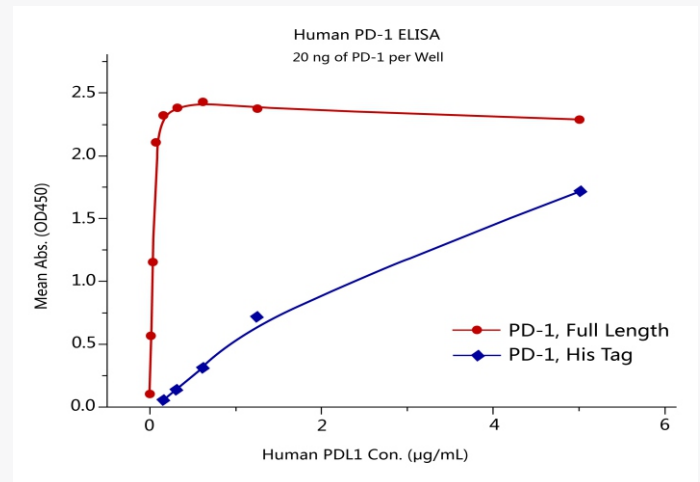
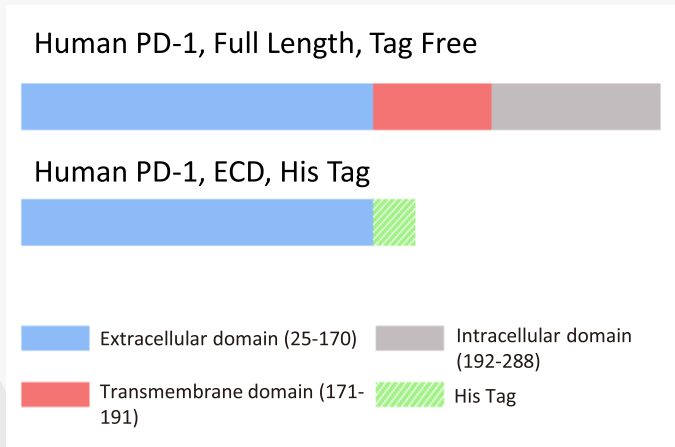
The purity of Human PD-L1 Protein, mouse IgG1 Fc Tag, low endotoxin (Cat.# PD1-H52A3) was more than 90% as determined by SEC-HPLC.

Molecule	Cat. No.	Product Desc.	Species	Structure	Purity	Size
PD-1	PD1-H5221	Human PD-1	 Human	PD-1 (25-167) His	>95% SDS >90% SEC-HPLC	100ug, 1mg
PD-1	PD1-H5257	Human PD-1	 Human	PD-1 (25-167) Fc	>95% SDS >90% SEC-HPLC	100ug, 1mg
PD-L1	PD1-H5229	Human PD-L1	 Human	PD-L1 (19-238) His	>98% SDS >90% SEC-HPLC	100ug, 1mg
PD-L1	PD1-H52A3	Human PD-L1	 Human	PD-L1 (19-238) mFc	>92% SDS >90% SEC-HPLC	100ug, 1mg
PD-L2	PD2-H5251	Human PD-L2	 Human	PD-L2 (20-219) Fc	>95% SDS >90% SEC-HPLC	100ug, 1mg

Full-length PD-1 Protein

ACROBiosystems newly added the world's first full-length human PD-1 protein. The full-length protein demonstrates a much higher binding affinity against PD-L1 than the PD-1 ECD protein.

Molecule	Cat. No.	Product Desc.	Species	Structure	Purity	Size
PD-1	PD1-HC214	Full-length Human PD-1, Tag free	Human	PD-1 (25-288)	>92% SDS	20ug



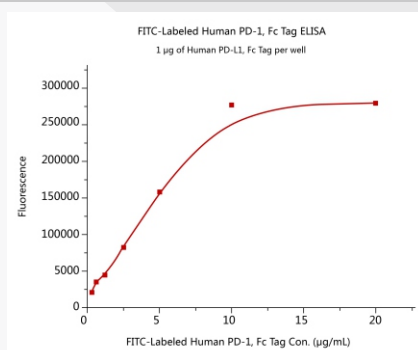
Protein structures of full-length human PD-1 (Cat. # PD1-HC214) and human PD-1 ECD protein (Cat. # PD1-H5221).

Immobilized full-length human PD-1 (Cat. # PD1-HC214, 20 ng/well) can bind human PD-L1 (Cat. # PD1-H52A3) with a linear range of 1.2-78 ng/ml, which is much higher than the PD-1 ECD protein (linear range 250 ng-1,250 ng/ml).

FITC-labeled PD-1

















Biotinylated PD-1 can be used with fluorescence-labeled streptavidin in FACS and immunostaining experiments. However, this process involves multiple rounds of incubation and washes, making it time-consuming. ACROBiosystems offers an FITC-labeled PD-1 protein, which allows one-step fluorescence detection.

Molecule	Cat. No.	Product Desc.	Species	Structure	Purity	Size
PD-1	PD1-HF257	FITC-labeled Human PD-1	Human	PD-1 (25-167) Fc	>95% SDS	25ug,200ug









Immobilized Human PD-L1, Fc tag (Cat. # PD1-H5258) at 10 µg/mL (100 µl/well) can bind FITC-labeled Human PD-1, Fc tag (Cat. # PD1-HF257) with a linear range of 0.3-5 µg/mL.

Full Product List

Molecule	Cat. No.	Product Desc.	Species	Structure	Purity	Size
PD-1	PD1-H82E4	Biotinylated Human PD-1	 Human	PD-1 (25-167) Avi His	>95% SDS	25ug, 200ug
PD-1	PD1-H82F2	Biotinylated Human PD-1	 Human	PD-1 (25-167) Fc Avi His	>95% SDS	25ug, 200ug
PD-1	PD1-HC214	Human PD-1, Tag Free, Full Length	 Human	PD-1 (25-288)	>92% SDS	20ug
PD-1	PD1-H5221	Human PD-1	 Human	PD-1 (25-167) His	>95% SDS >90% SEC-HPLC	100ug, 1mg
PD-1	PD1-H5257	Human PD-1	 Human	PD-1 (25-167) Fc	>95% SDS >90% SEC-HPLC	100ug, 1mg
PD-1	PD1-H5284	Human PD-1	 Human	PD-1 (25-167) Twin-Strep	>95% SDS	25ug, 250ug
PD-1	PD1-H9221	C13 and N15-labeled , Human PD-1	 Human	PD-1 (25-167) His	>90% SDS	2ug
PD-1	PD1-HF257	FITC-labeled Human PD-1	 Human	PD-1 (25-167) Fc	>95% SDS	25ug, 200ug
PD-1	PD1-M82F4	Biotinylated Mouse PD-1	 Mouse	PD-1 (25-167) Fc Avi	>92% SDS	25ug, 200ug
PD-1	PD1-M5228	Mouse PD-1	 Mouse	PD-1 (25-167) His	>95% SDS	100ug, 1mg
PD-1	PD1-M5259	Mouse PD-1	 Mouse	PD-1 (25-167) Fc	>92% SDS	100ug, 1mg
PD-1	PD1-M52A4	Mouse PD-1	 Mouse	PD-1 (21-167) mFc	>95% SDS	100ug, 1mg
PD-1	PD1-R5253	Rat PD-1	 Rat	PD-1 (25-167) Fc	>95% SDS	100ug, 1mg
PD-1	PD1-R52H2	Rat PD-1	 Rat	PD-1 (25-167) His	>95% SDS	100ug, 1mg
PD-1	PD1-RB5251	Rabbit PD-1	 Rabbit	PD-1 (25-167) Fc	>95% SDS	100ug, 1mg
PD-1	PD1-R52H0	Rabbit PD-1	 Rabbit	PD-1 (25-167) His	>95% SDS	100ug, 1mg

Molecule	Cat. No.	Product Desc.	Species	Structure	Purity	Size
PD-1	PD1-C5223	Cynomolgus PD-1	 Cynomolgus	PD-1 (25-167) His	>95% SDS	50ug, 1mg
PD-1	PD1-C5254	Cynomolgus PD-1	 Cynomolgus	PD-1 (25-167) Fc	>95% SDS	100ug, 1mg
PD-L1	PD1-H82E5	Biotinylated Human PD-L1	 Human	PD-L1 (19-238) Avi His	>95% SDS	25ug, 200ug
PD-L1	PD1-H82F3	Biotinylated Human PD-L1	 Human	PD-L1 (19-238) Fc Avi His	>95% SDS	25ug, 200ug
PD-L1	PD1-H9229	C13 and N15-labeled , Human PD-L1	 Human	PD-L1 (19-238) His	>95% SDS	5ug, 20ug
PD-L1	PD1-H5229	Human PD-L1	 Human	PD-L1 (19-238) His	>98% SDS >90% SEC-HPLC	100ug, 1mg
PD-L1	PD1-H52A3	Human PD-L1	 Human	PD-L1 (19-238) mFc	>92% SDS >90% SEC-HPLC	100ug, 1mg
PD-L1	PD1-H5258	Human PD-L1	 Human	PD-L1 (19-238) Fc	>95% SDS	100ug, 1mg
PD-L1	PD1-H5282	Human PD-L1	 Human	PD-L1 (19-238) Twin-Strep	>95% SDS	25ug, 250ug
PD-L1	PD1-M5220	Mouse PD-L1	 Mouse	PD-L1 (19-238) His	>95% SDS	100ug, 1mg
PD-L1	PD1-M82F5	Biotinylated Mouse PD-L1	 Mouse	PD-L1 (19-238) Fc Avi	>95% SDS	25ug, 200ug
PD-L1	PD1-M5251	Mouse PD-L1	 Mouse	PD-L1 (19-238) Fc	>95% SDS	200ug, 1mg
PD-L1	PD1-M52A2	Mouse PD-L1	 Mouse	PD-L1 (19-238) mFc	>95% SDS	100ug, 1mg
PD-L1	PD1-C5253	Cynomolgus PD-L1	 Cynomolgus	PD-L1 (19-238) Fc	>90% SDS	100ug, 1mg
PD-L1	PD1-C52H4	Cynomolgus PD-L1	 Cynomolgus	PD-L1 (19-238) His	>95% SDS	100ug, 1mg
PD-L2	PD2-H5251	Human PD-L2	 Human	PD-L2 (20-219) Fc	>95% SDS >90% SEC-HPLC	100ug, 1mg

Molecule	Cat. No.	Product Desc.	Species	Structure	Purity	Size
PD-L2	PD2-H82E8	Biotinylated Human PD-L2	 Human	PD-L2 (20-219) Avi His	>95% SDS	25ug, 200ug
PD-L2	PD2-H5220	Human PD-L2	 Human	PD-L2 (20-219) His	>95% SDS	100ug, 1mg
PD-L2	PD2-H52A5	Human PD-L2	 Human	PD-L2 (20-219) mFc	>95% SDS	100ug, 1mg
PD-L2	PD2-M5254	Mouse PD-L2 / B7-DC	 Mouse	PD-L2 (20-219) Fc	>95% SDS	100ug, 1mg
PD-L2	PD2-M52E3	Mouse PD-L2	 Mouse	PD-L2 (20-219) His	>95% SDS	100ug, 1mg
PD-1 & PD-L1	EP-101	PD-1[Biotin]: PD-L1 Inhibitor Screening Pair	 Human		96tests, 480tests	

PD-1

PD-L1

B7-1

B7-H2

PD-L2

B7-H5

CTLA-4

TIM-3 CTLA-4 4-1BB
Immune Checkpoint
Biotinylated HER2
B7-H4 TIGIT 4-1BB Ligand
FCRn CD40 GITR
PD-L2 HER2
DNAM-1 B7-1
TIM-3 FcRn
TNF- alpha LAG-3
CD19 OX40 Ligand B7-H2
PD-1 CD47 PCSK9
Immune Checkpoint
Biotin-labeled PD-L1
PCSK9 VEGF165 CD27 CD48
FcRn HER2 BTLA ICOS
B7-H4 TIM-3 CTLA-4
Biotin-labeled
HER2 PD-L2 B7-H4 DNAM-1
VEGF165 FcRn PD-L1
DNAM-1 PD-L2 BTLA CTLA-4
GTR Ligand Biotinylated Immune Checkpoint
4-1BB PCSK9 FcRn
PD-L2 PD-L2
TNF-alpha PD-L2