

**Description**

The binding of Programmed Cell Death Protein 1 (PD-1), a receptor expressed on activated T-cells, to its ligands PD-L1 and PD-L2, negatively regulates immune responses. PD-1 ligands are found on most cancers, and the PD-1:PD-L1/2 interaction inhibits T-cell activity and enables cancer cells to escape immune surveillance. The PD-1:PD-L1/2 pathway is also involved in regulating autoimmune responses, making these proteins promising therapeutic targets for a number of cancers, as well as multiple sclerosis, arthritis, lupus, and type I diabetes.

The PD-1 sgRNA-MS2 Lentiviruses are replication incompetent, HIV-based VSV-G pseudotyped lentiviral particles that are ready to infect almost all types of mammalian cells, including primary and non-dividing cells. The particles contain 5 sgRNA-MS2 (single guide RNA fused with an MS2 tag). When transduced in cells expressing dCas9-VP64 and MS2-P65-HSF1, these other proteins are recruited to the site in the genomic DNA that is targeted by the sgRNA and begin transcription, inducing expression of PD-1.

**Application**

- CRISPR Activation of PD-1 expression in dCas9-VP64 and MS2-P65-HSF1 expressing target cells

**Formulation**

The lentiviruses were produced from HEK293T cells in medium containing 90% DMEM + 10% FBS.

**Titer**

Two vials (500  $\mu$ l x 2) of lentivirus at a titer  $\geq 1 \times 10^6$  TU/ml. The titer will vary with each lot; the exact value is provided with each shipment.

**Storage**

Lentiviruses are shipped with dry ice. For long term storage, it is recommended to store the virus at -80°C. Avoid repeated freeze-thaw cycles. Titers can drop significantly with each freeze-thaw cycle.

**Biosafety**

None of the HIV genes (gag, pol, rev) will be expressed in the transduced cells. Although the pseudotyped lentiviruses are replication-incompetent, they require the use of a Biosafety Level 2 facility. BPS recommends following all local federal, state, and institutional regulations and using all appropriate safety precautions.

**License Disclosure**

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**Troubleshooting Guide**

Visit [bpsbioscience.com/lentivirus-faq](https://bpsbioscience.com/lentivirus-faq) for detailed troubleshooting instructions. For all further questions, please email [support@bpsbioscience.com](mailto:support@bpsbioscience.com).

Figures and Validation Data

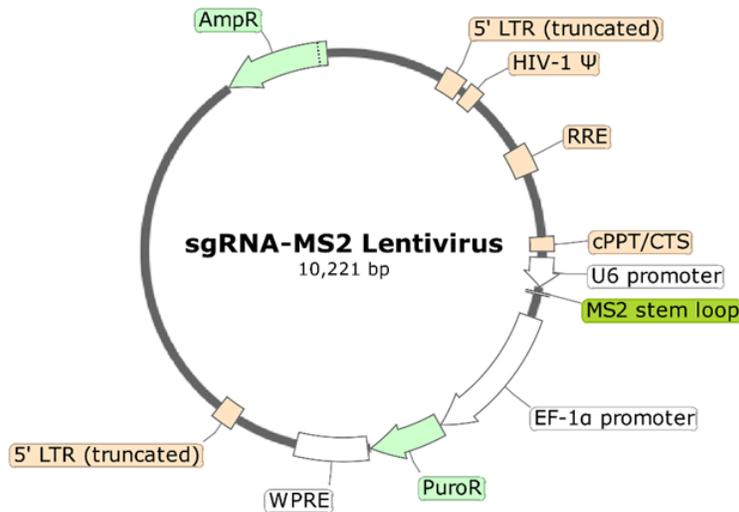


Figure 1. Schematic of the Lenti-vector used to generate the PD-1 sgRNA-MS2 Lentivirus

Gene Target:	Primer ID:	sgRNA Sequence
PD-1	PD-1-1	GTCTCTGTCTCTCTCCCT
PD-1	PD-1-2	GCCCCTTGCTCCCGCCCCCT
PD-1	PD-1-3	CCCCATCTCCTCTGTCTCCC
PD-1	PD-1-4	CCCCCAGCACTGCCTCTGTC
PD-1	PD-1-5	GTCTACCCCCTCCTCACCC

Figure 2. List of sgRNA Sequences in the PD-1 sgRNA-MS2 Lentivirus

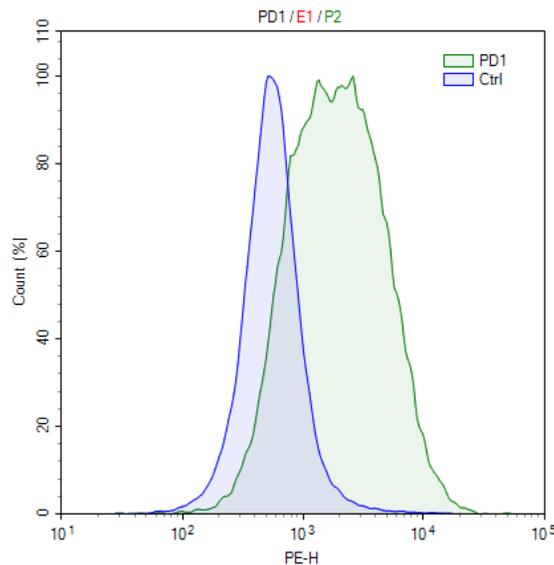


Figure 3. CRISPR Activation of PD-1 expression in HEK293 SAM cells.

HEK293 SAM cells (BPS Bioscience, #78192) were transduced with PD-1 sgRNA-MS2 lentivirus. 72 hours after transduction, cells were stained with PE-labeled anti-human CD279 (PD-1) antibody (BioLegend, #329905) and analyzed by flow cytometry. Parental HEK293 SAM cells are shown in blue, and the transduced cells are shown in green.

**Notes**

The CRISPR/CAS9 technology is covered under numerous patents, including U.S. Patent Nos. 8,697,359 and 8,771,945, as well as corresponding foreign patents applications, and patent rights.

**Related Products**

<i>Products</i>	<i>Catalog #</i>	<i>Size</i>
PD-1 sgRNA-MS2 for CRISPRa (Plasmid)	<a href="#">78091</a>	5 µg
PD-1 CRISPR/Cas9 Lentivirus (Non-Integrating)	<a href="#">78059</a>	500 µl x 2
PD-1 CRISPR/Cas9 Lentivirus (Integrating)	<a href="#">78052</a>	500 µl x 2
PD-L1 CRISPR/Cas9 Lentivirus (Non-Integrating)	<a href="#">78064</a>	500 µl x 2
PD-L1 CRISPR/Cas9 Lentivirus (Integrating)	<a href="#">78057</a>	500 µl x 2
PD-1 - HEK293 Recombinant Cell Line	<a href="#">60680</a>	2 vials
PD-1 / NFAT Reporter - Jurkat Recombinant Cell Line	<a href="#">60535</a>	2 vials