



Premade Lentiviral Particles for Human iPS Stem Factors

For generating induced pluripotent stem (iPS) cells or other applications.
FOR RESEARCH USE ONLY, not for diagnostic or therapeutic use.

Cat#	Product Name	amounts
LVP003	h OCT4 (RFP-Bsd) inducible particles	200ul x (1 x10 ⁷ IFU/ml)
LVP004	h SOX2 (RFP-Bsd) inducible particles	200ul x (1 x10 ⁷ IFU/ml)
LVP005	h NANOG (RFP-Bsd) inducible particles	200ul x (1 x10 ⁷ IFU/ml)
LVP006	h LIN28 (RFP-Bsd) inducible particles	200ul x (1 x10 ⁷ IFU/ml)
LVP007	h Myc (RFP-Bsd) inducible particles	200ul x (1 x10 ⁷ IFU/ml)
LVP008	h Klf4 (RFP-Bsd) inducible particles	200ul x (1 x10 ⁷ IFU/ml)
LVP311	h OCT4 (Neo) inducible particles	200ul x (1 x10 ⁷ IFU/ml)
LVP312	h SOX2 (Neo) inducible particles	200ul x (1 x10 ⁷ IFU/ml)
LVP313	h NANOG (Neo) inducible particles	200ul x (1 x10 ⁷ IFU/ml)
LVP314	h LIN28 (Neo) inducible particles	200ul x (1 x10 ⁷ IFU/ml)
LVP315	h cMyc (Neo) inducible particles	200ul x (1 x10 ⁷ IFU/ml)
LVP316	h KLF4 (Neo) inducible particles	200ul x (1 x10 ⁷ IFU/ml)
LVP317	h OCT4 (EF1α) (puro) particles	200ul x (1 x10 ⁷ IFU/ml)
LVP318	h SOX2 (EF1α) (puro) particles	200ul x (1 x10 ⁷ IFU/ml)
LVP319	h NANOG (EF1α) (puro) particles	200ul x (1 x10 ⁷ IFU/ml)
LVP320	h LIN28 (EF1α) (puro) particles	200ul x (1 x10 ⁷ IFU/ml)
LVP321	h Myc (EF1α) (puro) particles	200ul x (1 x10 ⁷ IFU/ml)
LVP322	h Klf4 (EF1α) (puro) particles	200ul x (1 x10 ⁷ IFU/ml)



LVP588	h OCT4 (EF1α) (RP) particles	200ul x (1 x10 ⁷ IFU/ml)
LVP589	h SOX2 (EF1α) (RP) particles	200ul x (1 x10 ⁷ IFU/ml)
LVP590	h NANOG (EF1α) (RP) particles	200ul x (1 x10 ⁷ IFU/ml)
LVP591	h LIN28 (EF1α) (RP) particles	200ul x (1 x10 ⁷ IFU/ml)
LVP592	h Myc (EF1α) (RP) particles	200ul x (1 x10 ⁷ IFU/ml)
LVP593	h Klf4 (EF1α) (RP) particles	200ul x (1 x10 ⁷ IFU/ml)

Storage: < -70 °C, avoid repeat freeze/thaw cycles. Products stable for 6 month.

Product Description:

GenTarget's lentivector system is Human Immunodeficiency Virus-1 (HIV) based plasmids for gene expression and knockdown. The lentivectors are used to generate lentiviral particles (lentivirus) that can be transduced into almost all kinds of mammalian cells, including stem cells, primary cells, and non-dividing cells both *in vivo* and *in vitro*. Lentiviral Particles stably integrate into the transduced cells' genome for long term expression, making it a great gene transfer agent.

Conversion of fully differentiated mouse or human somatic cells into embryonic-like cells (so called induced Pluripotent Stem Cells or iPSCs) has attracted enormous attention. Multiple reports have demonstrated that iPS cells can be generated by using a set of transcription factors or stem cell factors delivered via expression virus or by expressed proteins. The main stem cell factors are: OCT3/4, SOX2, NANOG, LIN28, c-Myc, and KLF4, although the combination of reprogramming factors may be slightly different. iPSCs hold the promise of curing many human diseases and accelerating stem cell research.

GenTarget provides **two sets of premade lentiviral particles** for human or mouse iPS genes. Each stem factor was natively expressed (without any tags) under either an [optional inducible suCMV promoter](#) (set#1) or enhanced **EF1a** promoter (set#2).



Utilizing our **Inducible Lentiviral Vector** system (see vector scheme below), GenTarget has generated high-titer inducible lentiviral particles for all six **human and mouse** stem cell factors. Each factor is fully sequence-verified and matched to the CDs in the NCBI database (see table below). High titer lentiviral particles/ supernatant were produced in 293T packaging cells (Cat# **TLV-C**) with a packaging mix (Cat# **HT-pack**). They are pseudotyped with VSV-G glycoprotein. They are packaged in DMEM medium (containing 10% FBS and 10x polybrene as ready-to-use status), and supplied as 200 µl/per vial at $\sim 1 \times 10^7$ IFU/ml.

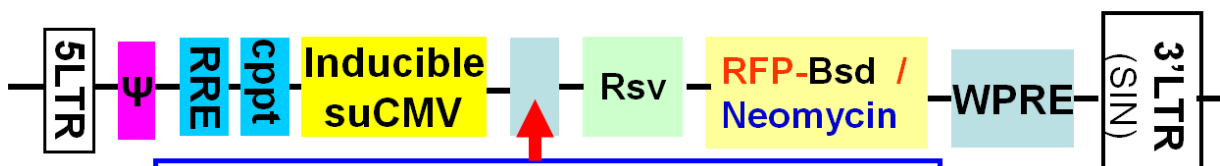
All six stem factor were sequencing verified. Their sequences fully match to the CD region according to the NCBI's database (see table below).

Target	NCBI ID	Matched ORF position
h Myc	NM_002467	526-1890
h Klf4	NM_004235	595-2034
h Oct3/4	NM_002701	55-1137
h SOX2	NM_003106	428-1381
h LIN28	NM_024674	115-744
h NANOG	NM_024865	217-1134

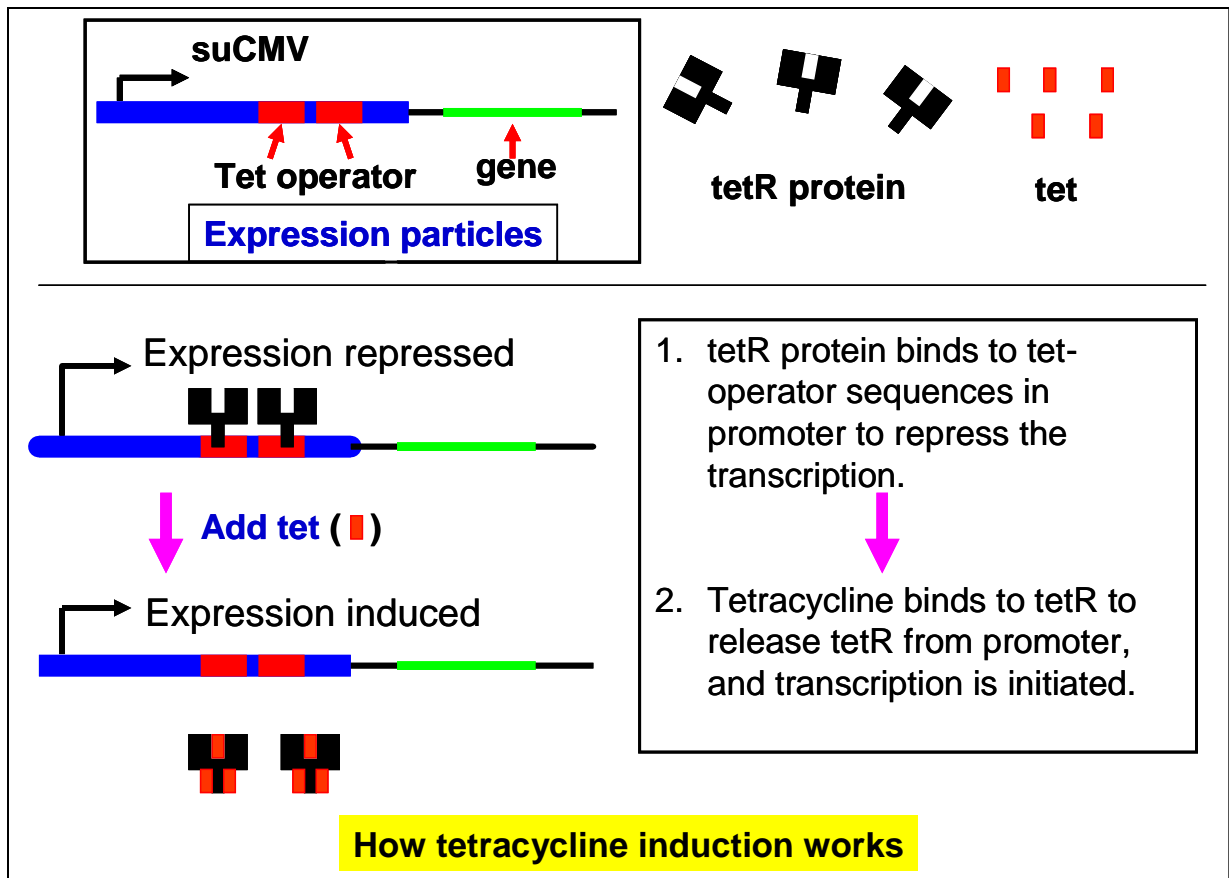
1. Set #1

Includes a tetracycline inducible **suCMV promoter** to drive iPS gene expression and contains a **RFP-Bsd** fusion dual or **Neomycin** selection marker under an **RSV promoter** (see vector map scheme below).

Set#1: schematic representation of **inducible** lentivector for iPSC



Stem Factors:
Oct3/ SOX2/ NANOG/ LIN28/c-Myc or KLF4



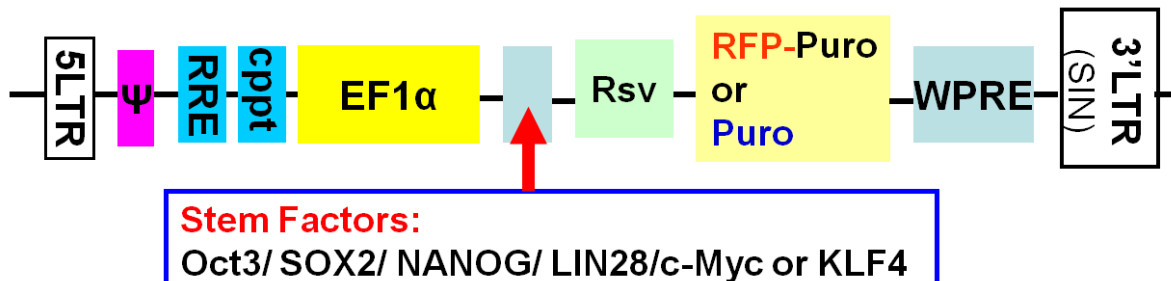
The particles in Set 1 can be used for regular constitutive high expression, or optionally for tetracycline-induced expression when the tetracycline regulator protein (tetR) is present in advance. For inducible expression, TetR must be expressed in advance to stop transcription; expression is then activated by adding tetracycline. This inducible expression is tetracycline dose dependent; in general, tetracycline is used at a final concentration of 1 $\mu\text{g/ml}$. Please see the schematic above for the mechanism of inducible expression, and see our website for more details about our [Inducible lentiviral system](#). GenTarget provides [premade lentivirus expressing TetR with a variety of antibiotic markers](#). For general information about lentiviral particles, please refer to [FAQ about premade lentiviral particles](#).

2. Set #2

Uses the enhanced constitutive **EF1 α** promoter to drive iPS gene expression (see vector map scheme below) with the option of using either a **RFP-puromycin** fusion dual marker or the **puromycin** marker alone.



Set#2: schematic representation of lentivector (EF1 α) for iPSC



Safety Precaution:

GenTarget lentiviral particles adapt must advanced lentiviral safety features (using the third generation vectors with self-inactivation SIN-3UTR), and the premade lentivirus is replication incompetent. However, please use extra caution when using lentiviral particles. Use the lentiviral particles in Bio-safety II cabinet. Wear glove all the time when handling Lentiviral particles! Please refer CDC and NIH's guidelines for more details regarding to safety issues.

Attachment:

iPS cell generation procedure for the Dox inducible system

(For reference only)

Day 0: Seed the parent cells:

- Seed human fibroblast cells at 1×10^5 cells/well in a 6-well plate, culture in 5ml of growth medium
- Incubate overnight at 37°C with 5% CO₂

Day 1: Viral Transduction:

- Remove medium, add 2.5 ml of pre-warmed fibroblast growth medium, and then add 500 μ l of iPS lentivirus. Gentle mix for even distribution.
- Incubate overnight at 37°C with 5% CO₂. [Note: set up inducible GFP positive control wells by adding 200 μ l/per well of GFP control particles]

Day 2: Change Medium

- At about 24 hours post-transduction, change to 5 ml growth medium.
- Incubated overnight at 37°C with 5% CO₂.

Day 3: Re-plate the transduced cells to feeder cells

- At three days post-transduction, trypsinize cells and centrifuge at 200 x g for 5 minutes
- Resuspend in Fibroblast Cell Growth Medium
- Re-plate in a 150mm MEF Feeder Dish
- Incubate overnight at 37 °C with 5% CO₂



Day 4: Induce Reprogramming using Dox

- At 24 hours after re-seeding, replace Fibroblast Cell Growth Medium with 2.0 ml Dox-Induction Medium containing 2µg/ml Dox. [**Note:** set up a negative control well without Dox.]
- Incubated Cells overnight at 37°C with 5% CO₂.

Day 5+: Change Induction Medium

- Change Dox-Induction Medium every 48 hours
- Continue to pass the cells until they show typical human ES cell morphology

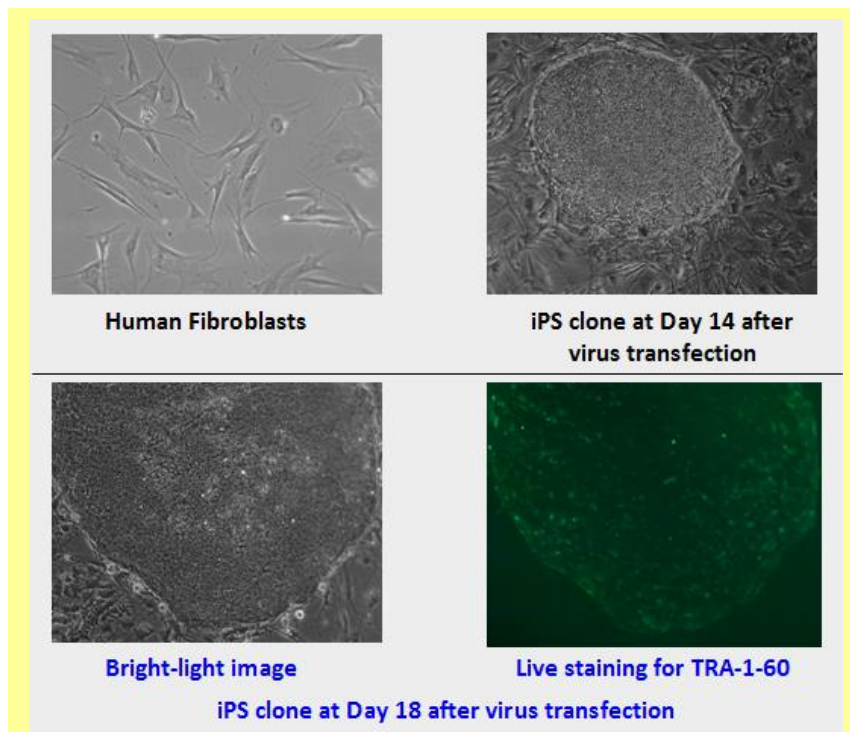
Day 14++: Select iPS cell colonies

- Pick the iPS cell colonies that conform to proper cell morphology using a sterile glass picking tool.
- Trypsinize each individually isolated iPS cell colony and pass into each well of a 24-well feeder plate.

Passage, and Expansion of iPS cell colonies

- Incubate a 24-well plate at 37°C and 5% CO₂,
- Replace culture medium with fresh medium without Dox every 48 hours.
- Passage into an appropriate size plate for iPS cell expansion (the process takes about 6-10 days).
- Monitor iPS cell colony growth and morphology, and validate the iPS colonies. Save iPS cells in cryogenic vials.

iPS cell sample images:





References:

1. [NIH stem cell training program \(Link\)](#).
2. Masaki Ieda, Ji-Dong Fu, et al. (2010). Direct Reprogramming of Fibroblasts into Functional Cardiomyocytes by Defined Factors. Cell 142, 375-386.
3. Takahashi, K. and Yamanaka, S. (2006). Induction of pluripotent stem cells from mouse embryonic and adult fibroblast cultures by defined factors. Cell 126, 663-676.
4. Yu, J., Vodyanik, M.A., Smuga-Otto, K., Antosiewicz-Bourget, J., Frane, J.L., Tian, S., Nie, J., Jonsdottir, G.A., Ruotti, V., Stewart, R., Slukvin, I.L., and Thomson, J.A. (2007). Induced pluripotent stem cell lines derived from human somatic cells. Science 318, 1917-1920.
5. Park, I.H., et al., Reprogramming of human somatic cells to pluripotency with defined factors. Nature, 2008. 451(7175): p. 141-6.
6. Shao, L., et al., Generation of iPS cells using defined factors linked via the self-cleaving 2A sequences in a single open reading frame. Cell Res., 2009. 19(3): p. 296-306.
7. NIH Guidelines for [Biosafety Considerations for Research with Lentiviral Vectors](#). (Link).
8. [CDC guidelines for Lab Biosafety levels \(Link\)](#).

Attachment: GenTarget's pre-made lentivirus product categories.

Product Category	Product Description (please click into each category's page)
Pathway Reporter	Repoter Lentivirus for all kinds of pathway screening assays
Cell Immortalization	Lentivirus for cell immortalization: Large T-antigen, hTERT, EBNA1/EBNA2, HpV16-E6/E7, Adenovial E1A, Kras_G12V, HOXA9, et al.
ImmunoOncology Research	Lentivirus products for immuno therapy research: CAR and TCR; Assay Cell Lines for T-cell targeted killing assay and other cell-based assays; over-expression lentivirus products for the immune response targets; Cell surface antigens (CDs); immune checkpoint / Receptors; CRISPR gene Repair and knock-IN lentivirus; CRISPR knockout lentivirus;
CAR-T, TCR Lentivirus	CARs Lentivirus: Anti-CD19 /CD20 /CD22 /BCMA /hHER2 /HLA-A2 /TGFβ; TCRs : MART-1/ NY-ESO1/ CD1d-α-GalCer/ TRaV3-F2A-TRβV5-6;
CRISPR Gene Editing	Preamde lentivirus express humanized wild-type Cas9 endonuclease, the dCas9 , gRNAs, CRISPR gene editing research
Epigenomic: CRISPRi and CRISPRa	" dCas9-Protein " fusion Lentivirus for epigenomic modification, resulted in CRISPR interference (CRISPRi) or activation (CRISPRa).
Cell-Specific Reporter	a set of reporter lentiviruses to express a luminescence or fluorescent reporter (firefly Luciferase, Renilla luciferase, RFP or GFP fluorescent marker) under a tissue specific promoter



Product Category	Product Description (please click into each category's page)
Infectious Antigens	Lentivirus that express all kinds of infectious antigens with C-term 6His-tag.
Virus Like Particles (VLP)	Lentiviral Like Particles, pseudo-typed with a different envelope proteins.
Non-integrating LV	Integration Defective Lentivirus, express different targets for transient expression without the unwanted insertional mutagenesis.
shRNA Knockdown	Knockdown verified and customized shRNA lentivirus for target knockdown,
microRNA lentivirus	Premade lentivirus expression human or mouse precursor miRNA . And anti-miRNA lentivector and virus for human and mouse miRNA.
Anti-miRNA lentivirus	Pre-made lentivirus expression a specific anti-miRNA cassette.
Human and mouse ORFs	Premade lentivirus express in a human, mouse or rat gene with RFP-Blasticidin fusion dual markers.
Luciferase expression	Premade lentivirus for all kinds of luciferase protein expression: firefly and Renilla, Red-Luc and more , with different antibiotic selection markers.
Fluorescent Markers	Lentivirus express all commonly used fluorescent proteins: GFP, RFP, CFP, BFP YFP, mRFP, unstable GFP and others.
Luminescent Imaging	Lentivirus express Nano-Lantern as Bio-probes for in vivo imaging of sub-cellular structural organization and dynamic processes in living cells and organisms
Sub-cellular Imaging	Lentivirus contain a well-defined organelle targeting signal fused to a fluorescent protein, great tools for live-cell imaging and for dynamic investigation of sub-cellular signal pathways.
Cytoskeleton Imaging	A fluorescent marker (GFP, RFP or CFP) fusion with a cellular structure protein, provides a convenient tool for visualization of cytoskeletal structure
Unstable GFP	Lentivirus express the destabilized GFP (uGFP) which provides fast turnover responses in signal pathway assay and in knockdown / knockout detection



Product Category	Product Description (please click into each category's page)
near-infrared RFP	The near-infrared Red fluorescent (niRFP) expression Lentiviruses provides the whole-body images with better contrast and brighter images
Fluorescent-ORF fusion	Pre-made lentivirus expression a " GFP/RFP/CFP-ORF " fusion target.
CRE recombinase	Premade lentivirus for expressing nuclear permeant CRE recombinase with different fluorescent and antibiotic markers.
CRE, Flp ColorSwitch	Lentivirus expressing "LoxP-GFP-Stop-LoxP-RFP" or "FRT-GFP-Stop-FRT-RFP" cassette, used to monitor the CRE or Flp recombination event in vivo.
SEAP Reporter	lentivirus expressing SEAP under different promoters (TetCMV, EF1a, CAG, Ubc, mPGK, Actin-beta or a signal pathway responsive promoter),
TetR Repressor	Premade lentivirus expressing TetR (tetracycline regulator) protein, the repressor protein for the inducible expression system.
rtTA Expression	rtTA binds to the tetracycline operator element (TetO) in the presence of doxycycline (Dox). Used for Tet-On /OFF inducible system.
iPS factors	Premade lentivirus for human and mouse iPS (Myc, NANOG, OCT4, SOX2, FLK4) factors with different fluorescent and antibiotic markers
LacZ expression	Express different full length β-galactosidase (lacZ) with different selection markers
Negative control lentiviruses	Premade negative control lentivirus with different markers : serves as the negative control of lentivirus treatment, for validation of the specificity of any lentivirus target expression effects.
Other Enzyme expression	Ready-to-use lentivirus, expressing a specific enzymes with different selection markers.
Ultra titer lentivirus	Ultra-titer lentivirus used for the hard-to-transduced cells and for in vivo manipulation of sperm cells, or stem cells.