

---

Product Manual

# ViraSafe™ Lentiviral Bicistronic Expression System (GFP), Ecotropic

Catalog Number

VPK-218-ECO

1 kit

**FOR RESEARCH USE ONLY**  
Not for use in diagnostic procedures

---



**CELL BIOLABS, INC.**  
*Creating Solutions for Life Science Research*

## **Introduction**

Lentivirus vector based on the human immunodeficiency virus-1 (HIV-1) has become a promising vector for gene transfer studies. The advantageous feature of lentivirus vector is the ability of gene transfer and integration into dividing and non-dividing cells. The pseudotyped envelope with vesicular stomatitis virus envelope G (VSV-G) protein broadens the target cell range. Lentiviral vectors have been shown to deliver genes to neurons, lymphocytes and macrophages, cell types that previous retrovirus vectors could not be used. Lentiviral vectors have also proven to be effective in transducing brain, liver, muscle, and retina *in vivo* without toxicity or immune responses. Recently, the lentivirus system is widely used to integrate siRNA efficiently in a wide variety of cell lines and primary cells both *in vitro* and *in vivo*.

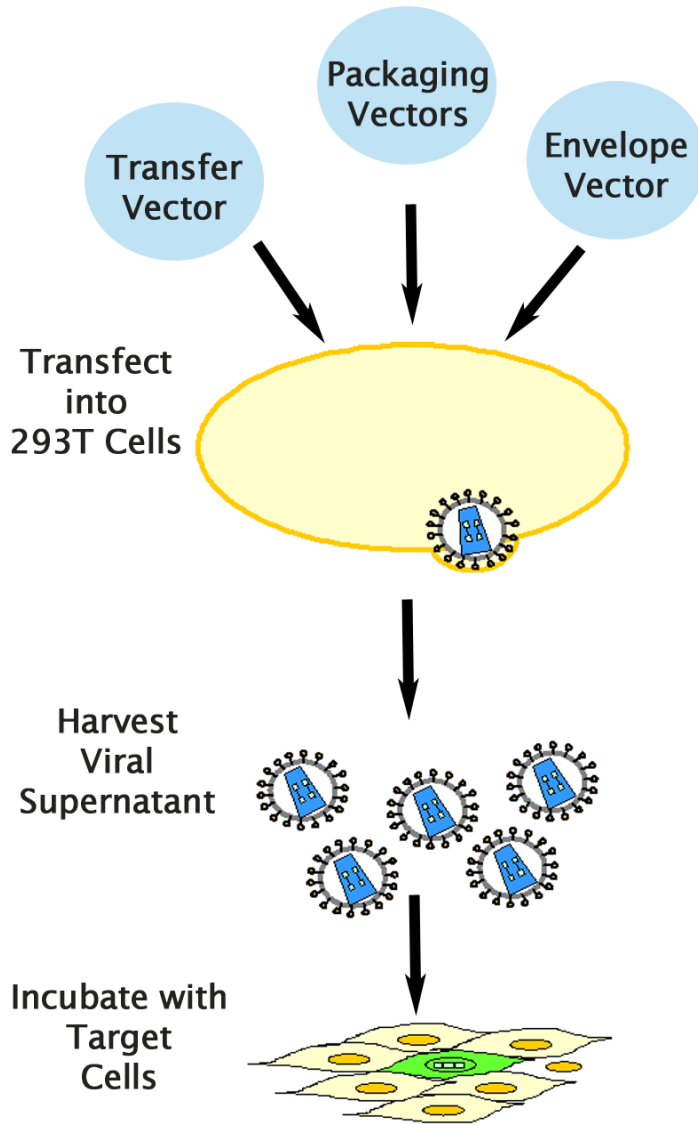
Lentivirus particles are produced from 293T cells through transient transfection of plasmids that encode for the components of the virion (Figure 1). Due to safety concerns regarding the infectious nature of HIV-1, recent lentiviral packaging systems have separated the viral components into 3 or 4 plasmids. However, these systems still present a small chance of generating replication-competent lentivirus upon recombination. In addition, most commercial lentiviral packaging systems provide plasmids containing the viral structure proteins in a premixed formulation, making it nearly impossible to optimize the ratio of the various plasmids for your particular experiment and host cell. Also, most commercial lentivirus transfer vectors contain promoters, antibiotic selection markers and/or reporter genes which may not be optimal or even suitable for your particular expression studies.

Cell Biolabs' ViraSafe™ Lentiviral Expression System provides a much safer method to package lentivirus, while still providing high viral titers. The sequence homology with native HIV-1 has been reduced by 80-90% even compared with other commercial third-generation packaging systems. In addition, each plasmid is provided separately rather than in a packaging mixture. This allows you the flexibility to amplify individual plasmids and optimize the ratio of plasmids for your experiment.

pSMPUW-IRES-GFP Lentiviral Expression Vector contains EF-1 $\alpha$  promoter ahead of the multiple cloning sites, followed by an IRES and GFP reporter gene (Figure 2).

Key Features of ViraSafe™ Lentiviral Expression System:

1. Transfer Plasmid: Reduce extent of HIV sequences to increase capability up to 10 kb and reduce likelihood of recombination between vector components. Add elements to increase titer and further improve safety.
2. Packaging Plasmid: Improve the packaging plasmid to increase performance and reduce the likelihood of recombination between vector components.
  - a. Minimize HIV sequences – no accessory proteins, Tat or Rev, or LTRs
  - b. Prevent overlap with vector SM by codon wobbling Gag sequences
  - c. Boost particle production by incorporating adenovirus VA<sub>I</sub> element
3. Flexible: All vectors including packaging vectors are provided separately to allow end-user to optimize the vector ratio for maximal lentivirus production.

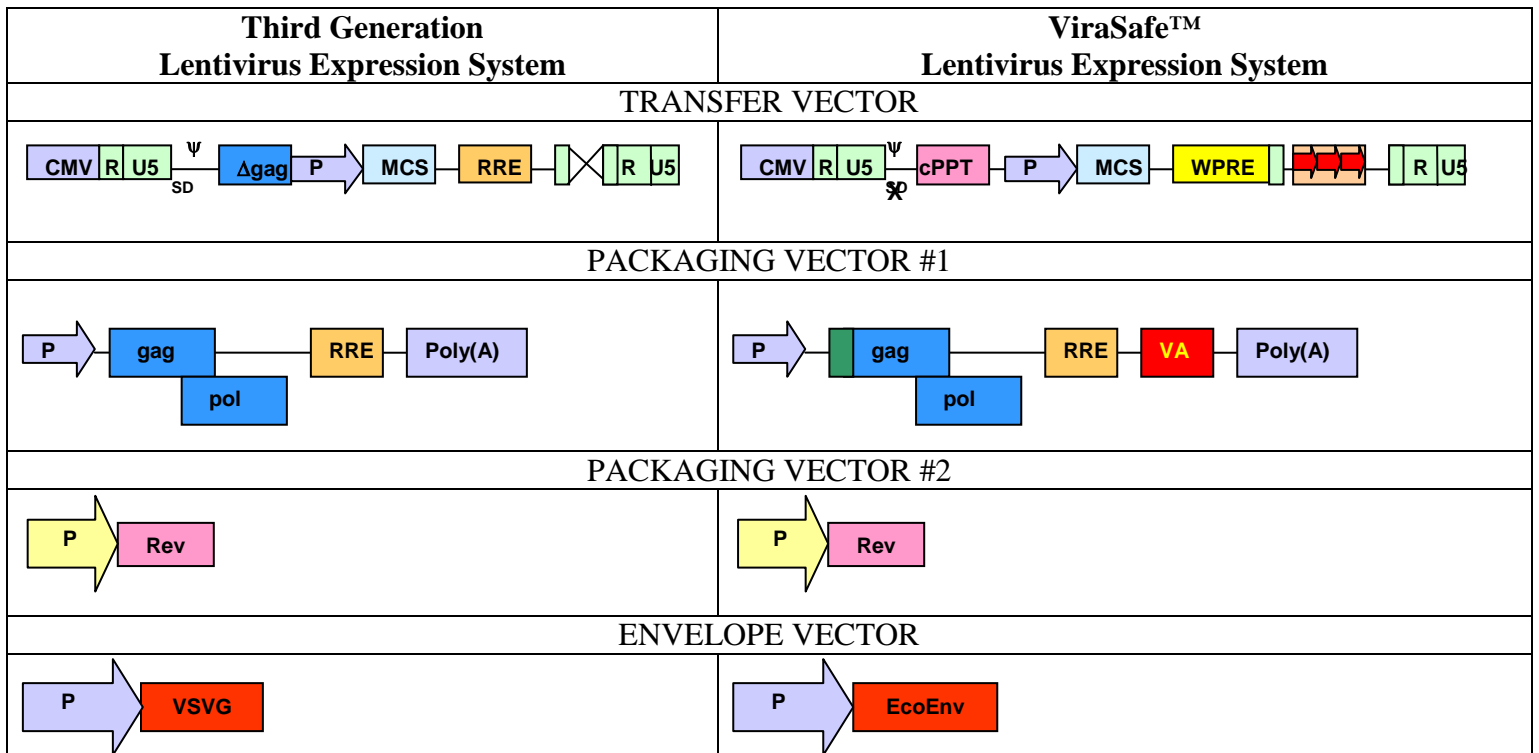


**Figure 1.** Lentivirus Production in 293T Cells

### **Related Products**

1. LTV-100: 293LTV Cell Line
2. LTV-200: ViraDuctin™ Lentivirus Transduction Kit
3. LTV-300: GFP Lentivirus Control
4. VPK-090: ViraBind™ Lentivirus Concentration and Purification Kit
5. VPK-107: QuickTiter™ Lentivirus Titer Kit (Lentivirus-Associated HIV p24)
6. VPK-108-H: QuickTiter™ Lentivirus Quantitation Kit (HIV p24 ELISA)
7. VPK-205: ViraSafe™ Lentivirus Packaging System, Ecotropic
8. VPK-211: pSMPUW Universal Lentiviral Expression Vector (Promoterless)

## Unique Elements of the ViraSafe™ Lentivirus Expression System



Vector Name	Element	Name	Benefits compared to other 3 <sup>rd</sup> Generation Systems
<b>ELEMENTS ADDED</b>			
Transfer Vector		Central Polypurine Tract	<ul style="list-style-type: none"> <li>Increased gene expression levels</li> </ul>
		Hybrid 3' LTR Poly(A)	<ul style="list-style-type: none"> <li>Increased safety: prevents read-through transcription</li> <li>Increased viral titer: vector transcript more stable in packaging cells</li> </ul>
		WPRE	<ul style="list-style-type: none"> <li>Increased viral titer</li> </ul>
Packaging Vector #1		Codon Wobble	<ul style="list-style-type: none"> <li>Increased safety: reduces sequence homology</li> </ul>
		Adenovirus VA	<ul style="list-style-type: none"> <li>Increased viral titer</li> </ul>
<b>ELEMENTS REMOVED</b>			
Transfer Vector		Gag sequence	<ul style="list-style-type: none"> <li>Increased safety: reduces sequence homology</li> </ul>
		Rev-Responsive Element	<ul style="list-style-type: none"> <li>Increased safety: reduces sequence homology</li> </ul>

## **Kit Components**

1. pSMPUW-IRES-GFP Lentiviral Expression Vector (Part No. VPK-218): One 40  $\mu$ L vial at 0.25 mg/mL. The plasmid is kanamycin resistant.  
*Note: Please see Figure 2 for important instructions on bacterial culture of this plasmid.*
2. pRSV-Rev Packaging Vector (Part No. 320022): One 40  $\mu$ L vial at 0.25 mg/mL.
3. pCMV-Eco Envelope Vector (Part No. 320026): One 40  $\mu$ L vial at 0.25 mg/mL.
4. pCgpV Packaging Vector (Part No. 320024): One 40  $\mu$ L vial at 0.25 mg/mL.
5. pSMPUW-LacZ Control Vector (Part No. 320025): One 40  $\mu$ L vial at 0.25 mg/mL containing a nuclear localized LacZ driven by MND retroviral LTR promoter. The plasmid is kanamycin resistant.  
*Note: Please see Figure 2 for important instructions on bacterial culture of this plasmid.*

## **Materials Not Supplied**

1. 293T cells: we recommend 293LTV Cell Line (Cat.# LTV-100) for high titer production of lentivirus.
2. Cell Culture Medium
3. Transfection Reagents

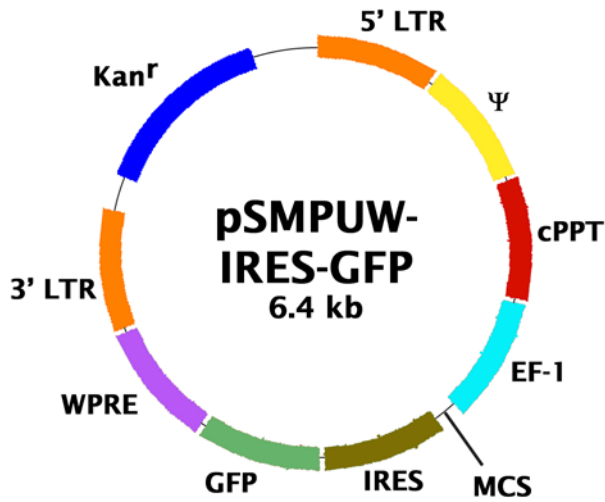
## **Storage**

Upon receipt, store all other kit components at -20°C until their expiration dates.

## **Safety Considerations**

Remember that you will be working with samples containing infectious virus. Follow the recommended NIH guidelines for all materials containing BSL-2 organisms. The ViraSafe™ Lentiviral Expression System is designed to minimize the chance of generating replication-competent lentivirus, but precautions should still be taken to avoid direct contact with viral supernatants.

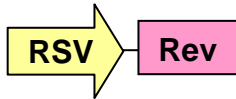
**pSMPUW-IRES-GFP Vector**



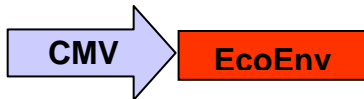
MCS: TTCGGCCGCGCCAGATATCTCCCTTCGGACCAAGGGTCATTAATTAAGAATTCCCTGCAGGCCTCGA  
 FseI EcoRV AhdI PacI EcoRI SbfI

**Figure 2:** pSMPUW-IRES-GFP Lentiviral Expression Vector (6399 bp, **Kanamycin**-resistant). XhoI Digestion: 1701 bp + 4698 bp.

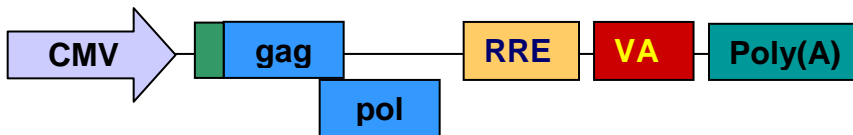
*Note: Bacterial culture of pSMPUW vectors should be done in medium containing 10 µg/mL Kanamycin. For maximal plasmid yield and quality, we recommend Stbl3 endoA1+ competent cells (Invitrogen) and treatment with alkaline proteinase (Promega #A1441 or Sigma #P8038) for 4-5 min using 10 units of proteinase per mL of bacterial lysate before adding neutralization solution.*



**Figure 3:** pRSV-Rev Packaging Vector (4180 bp, **Ampicillin**-resistant). EcoRI Digestion: 300 bp + 3880 bp



**Figure 4:** pCMV-Eco Envelop Vector (6763 bp, **Ampicillin**-resistant). BamHI Digestion: 777 bp + 5986 bp.



**Figure 5:** pCgpV Packaging Vector (9118 bp, **Ampicillin**-resistant). Pst I Digestion: 927 bp + 1424 bp + 6767 bp.

## **Lentivirus Production**

1. One day before transfection, plate sufficient 293T cells or 293LTV cells (Cat. # LTV-100) to achieve 70-80% confluence on the day of transfection.
2. Transfect cells by Calcium Phosphate or other transfection reagents.

*Note: We suggest transfecting cells with FuGENE® Transfection Reagent (Roche Applied Science) or Lipofectamine™ Plus (Invitrogen). We recommend the ratio of vectors at 3:1:1:1 (pSMPUW: pCMV-Eco:pRSV-REV:pCgpV).*

3. Harvest lentiviral supernatant 36-72 hours after transfection. Supernatant can be harvested 2 or 3 times, every 12 hours. Keep it at 4°C over the collecting period.
4. Pool the collected supernatants, centrifuge 5 minutes at 1500 rpm to remove cell debris and filtrate on 0.22 µm.
5. Supernatants can be used directly or purified/concentrated if needed. For long term storage, store supernatant at -80°C in aliquots.

## **Post-Packaging Considerations**

Packaging your lentivirus is only the first step to ensuring successful expression of your gene. The following steps should be considered prior to infection of your host cell:

1. **Concentration and purification of your lentivirus:** Because of the latent nature of lentivirus, it is imperative that your virus be highly concentrated before infecting your host cell. Also, impurities from your viral supernatant can decrease the efficiency of infection. We recommend using Cell Biolabs' ViraBind™ Lentivirus Concentration and Purification Kit (Catalog # VPK-090).
2. **Measure the titer of your lentivirus:** This is an important step to ensure consistent viral transduction into your host cell. However, QPCR or stable clone counting can take as much as 1-2 weeks to perform. Traditional p24 ELISA kits can greatly overestimate your lentiviral titer. Our advanced p24 ELISA, QuickTiter™ Lentivirus Titer Kit (Catalog # VPK-107), uses exclusive technology that eliminates free p24 from your supernatant, giving you much more accurate lentiviral titers. Results are obtained in 6-18 hours.
3. **Use transduction reagents to increase infection efficiency:** Many cells are difficult to infect with lentivirus, and without supplemental reagents transduction efficiencies can be low. Reagents such as Polybrene® can help, but are often insufficient. Cell Biolabs' proprietary reagents in our ViraDuctin™ Lentivirus Transduction Kit (Catalog # LTV-200) form a super-complex with your virus to increase transduction efficiencies by promoting virus and cell interaction.

# Appendix

## pSMPUW-IRES-GFP Plasmid Sequence

- Pink:** 5' CMV/LTR,  $\psi$ , cPPT
- Blue:** EF-1
- Red:** IRES
- Green:** GFP
- Purple:** MCS
- Brown:** WPRE
- Orange:** 3' LTR
- Blue:** Kanamycin Resistance gene

ACTAGTCGGGGTCATTAGTTCATAGCCCATATATGGAGTTCGCGTTACATAAECTACGGTAAATGGCCCGCTGGCTGACCGCCCAACGCCCCCGCCATT  
GACGTCAATAATGACGTATGTTCCCATAGTAAACGCCAATAGGGACTTTCATTGACGTCAATGGGTGGAGTATTTACGGTAACTGCCACTTGGCAGTACAT  
CAAGTGTATCATATGCCAAGTACGCCCTATTGACGTCAATGACGGTAAATGGCCCGCTGGCATTATGCCAGTACATGACCTTATGGGACTTTCCACTT  
GGCAGTACATCTACGTATTAGTTCATCGTATTACCATGGTGATGCGGTTTTGGCAGTACATCAATGGGCGTGGATAGCGGTTTACTCACGGGGATTTCCAAG  
TCTCCACCCCATGACGTCAATGGGAGTTTGTGGTGGCACCAAAATCAACGGGACTTTCAAAATGTCGTAACAACCTCCGCCCATGACGAAAATGGGCGGT  
AGGCGTGTACGGTGGGAGTCTATATAAGCAGAGCTGGTTTTAGTGAACCGGCTCTCTGGTTAGACCAGATTTGAGCCTGGGAGCTCTGGCTAACTAGGG  
AACCCTGCTTAAGCCTCAATAAAGCTTGCTTGGTTCAGTGTCTCAAGTAGTGTGCGGCTGTGGTGTGACTCTGGTAACTAGAGATCCCTCAGACCCTTT  
AGTCAGTGTGGAAAATCTCTAGCAGTGGCGCCGAACGGGACTGAAAGCGAAAGGGAAACAGAGGAGCTCTCGACGAGGACTCGGCTTGTCTGAAGCG  
CGCACGGCAAGAGGCGAGGGCGGCGACTGCAGAGTACGCCAAAATTTGACTAGCGGAGGCTAGAAGGAGAGATGGGTGCGAGAGCGTCAATTAAGCG  
GGGAAAATAGCGGCCGCCCAATTTTAAAAGAAAAGGGGGGATGGGGGGTACAGTGCAGGGGAAAGAATAGTAGACATAATAGCAACAGACATACAAACTA  
AAGAATTACAAAAACAATTAACAAAATTTCAAAATTTTCGGGGGATCCGCTCCCGTCAACACCCCCCAACCCGCCCGACCGGAGCTGAGAGTAATTCAT  
ACAAAAGGACTCGCCCTGCTTGGGAATCCAGGGACCGTCTTAACTCCACTAACGTAGAACCCAGAGATCGCTGCGTTCCCGCCCTCACCCGCC  
GCTCTCGTCACTACTGAGGTGGAGAAGAGCATGCGTGAGGCTCCGGTCCGCTCAGTGGGCAGAGCGCACATCGCCACAGTCCCGGAGAAGTTGGGGGAGG  
GGTCCGCAATTAAGCCGTTGCTAGAGAAGTGGCGGGGTAACGGGAAAGTGTGCTGACTGGCTCCGCTTTTCCGAGGGTGGGGGAGAACCG  
TATATAAGTGCAGTAGTCGCGTGAACGTTCCGCGGCCAGATATCCCTTCGGACCAAGGTCATTAATTAAGAATTCCTGCAGGCCTCGAGGGCCGGCGC  
CGCCGGCCGCTACGTAATTCGCCCTCTCCCTAACGTTACTGGCCGAAGCCGCTTGAATAAGCCGGTGTGCGTTTGTCTATATGTTATTTCCACCAT  
ATTCCGCTCTTTGGCAATGAGGGCCCGAAACCTGGCCCTGTCTTTCAGCAGCATCTTAGGGTCTTTCCCTCTCGCCAAAGGAATGCAAGGTCTG  
TTGAATGTCTGGAAGGAGCAGTTCCCTGGAAGCTTCTTGAAGACAAAACAACGTCGTAGGACCCCTTTCAGGCGAGCGGAACCCCCACCTGGCGCAGGT  
GCCTCTGCGGCCAAAAGCCACGTGTATAAGATACCTGCAAAGCGGCACAAACCCAGTGCCACGTTGTGAGTTGGATAGTTGTGGAAAGAGTCAATGGCT  
CTCCTCAAGCGTATTCAACAAGGGGCTGAAGGATGCCAGAGGTACCCCATGTATGGGATCTGATCTGGGGCCTCGGTGCACATGCTTTACATGTGTTAG  
TCGAGGTTAAAAAACGTCCTAGGCCCCCGAACACGGGGACGTGGTTTTCTTTGAAAAACACGATGATAATATGGCCACAACCTGGTGAGCAAGGGCGAG  
GAGCTGTTCCCGGGTGGTGCCATCTGGTTCGAGCTGGACGGCAGCTAAACGGCCACAAGTTCAAGCTGTCCGGCGAGGGCGAGGGCGATGCCACTACG  
CAAGCTGACCTGAAGTTCACTGACCCACGGCAAGCTGGCCGCTGGCCACCCCTCGTGACCACCTGACCTACGGCGTGCAGTCTTACGCGCTA  
CCCCGACCACATGAAGCAGCAGCACTTCTTCAAGTCCGCCATGCCGAAGGCTACGTCAGGAGCGCACCATCTTCTTCAAGGACGACGGCAACTACAAGACC  
CGCGCCGAGGTGAAGTTCGAGGGCGACCCCTGGTGAACCGCATCGAGCTGAAGGGATCGACTTCAAGGAGGACGGCAACATCTGGGGCACAAGCTGGAGT  
ACAACATAACAGCCACAACGCTATATCATGGCCGACAAGCAGAAGAACGGCATCAAGGTGAACCTCAAGATCCGCCACAACATCGAGGACGGCAGCGTGC  
GCTCGCCGACCACTACCAGCAGAACCCCCATCGGGCAGCGCCGCTGCTGCTCCCGCACAAACACTACCTGAGCACCAGTCCGCTGAGCAAAAGACCC  
AACGAGAAGCCGATCACATGCTGCTGAGTTCGTGACCCCGCGGGATCACTCTCGCATGGACGCTGTACAAGTAAAGTCGACAATCAACCTCTGG  
ATTACAAAATTTGTGAAAGATTGACTGGTATTTCTTAACTATGTTGCTCTTTTACGCTATGTGGATACGCTGCTTTAATGCCTTTGTATCATGCTATTGCTTC  
CCGTATGGCTTTCATTTCTCTCTCTGTATAAATCCTGGTTGCTGCTCTTTATGAGGAGTGTGGCCCGTGTGTCAGGCAACGTGGCGTGGTGTGCACTGTG  
TTGCTGACGCAACCCCACTGGTTGGGGCATTGCCACCACCTGTGAGTCTCTTCCGGGACTTTCGCTTTCCCTCCCTATTGCCACGGCGGAACCTCATCG  
CCGCTGCCTTGGCCGCTGCTGGACAGGGGCTCGGCTGTTGGCCTAGCAATCCGTGGTGTGTGCGGGAAATCATGCTCTTTCTTGGCTGCTCGCTCTG  
TGTTGCCACCTGGATTCTGCGCGGGACGCTCTTCTGCTACGTCCTTTCGGCCCTCAATCCAGCGGACCTTCTTCCGCGGCGCTGTCGGGCTCTGCGGCCT  
CTTCCGCTCTTTCGCTTCCGCTCAGACGAGTCCGATCTCCCTTTGGGCCGCTCCCGCTTAGTACTGGTACCTTTAAGACCAATGACTTACAAGGACGCT  
GTAGATCTTAGCCACTTTTTAAAAGAAAAGGGGGACTGGAAGGGCTAATTAACCTCCAACGAAGACAAGATTCGGGAATTTATTTGTGAAATTTGTGATGCT  
ATTGCTTTATTTGTAACCGGTGCAGCTGCTTTTGGCTGTACTGGGCTCTCTGGTTAGACCAGATCTGAGCCTGGGAGCTCTGGCTAACTAGGGAAACCC  
ACTGCTTAAGCCTCAATAAAGCTTGCCTTGAAGTCTCAAGTAGTGTGTCGCGCTGTGGTGTGACTCTGGTAACTAGAGATCCCTCAGACCCTTTTACTCA  
GTGTGGAAAATCTCTAGCACTAGAGTATGCAAAGCATGCATCTCAATTAGTCAGCAACAGGTTGGAAAGTCCCAAGCTCCCGAGGCTCCCGAGGCGAGAATAGC  
AAAGCATGCATCTCAATTAGTCAGCAACCATAGTCCCGCCCTAACTCCGCCATCCCGCCCTAACTCCGCCAGTTCGCCCATTTCTCCGCCCATGGCTG  
ACTAATTTTTTTTATTTATGAGAGGCGGAGCCGCTCGGCTCTGAGCTATCCAGAAGTAGTGGAGGCTTTTTTTGGAGGCTTAGGCTAGAGATCATAA  
TCAGCCATACACATTTGTAGAGGTTTTACTTGTCTTAAAAAACCTCCACACCTCCCTGAACTGAAACATAAAAATGAATGCAATTTGTTGTTGTTAACTT  
GTTTATGTCAGCTTATAATGGTTACAATAAAGCAATAGCATCAAAAATTTCAAAAATAAGCATTTTTTTCACTGCATCTAGTTGTGGTTTTGTCCAACTC  
ATCAATGATCTTATCATGCTGCTGACCGGGCTTTTTTCTTAGCCCTTCTCCGCTTCTCGCTACCTGCTCGCTACCTGCTGCGCTCGGCTGCGCTGCGCG  
AGCGGTATCAGCTCAACAGGCGTAATACGGTTATCCACAGAATCAGGGGATAACGCAGGAAAGAACATGTGAGCAAAAGGCCAGCAAAAGGCCAGGAAC  
CGTAAAAGGCGCGTGTGCTGGCTTTTTCCATAGGCTCCGCCCTGACGAGCATCAAAAATCGACGCTCAAGTCAGAGGTGGCGAAACCCGACAGGAC  
TATAAAGATACAGGCGTTTTCCCTGGAAGCTCCCTCGTGCCTCTCTGTTCCGACCTTCCGCTTACCGGATACCTGTCCGCTTTCTCCCTTCCGGAAG  
CGTGGCGCTTCTCATAGCTACGCTGTAGGTATCTCAGTTCGGTGTAGGTCGTTCCGCTCAAGCTGGGCTGTGTGCAGAACCCCGCTTACGCCGACCGC

TGCGCCTTATCCGGTAACTATCGTCTGAGTCCAACCCGGTAAAGACACGACTTATCGCCACTGGCAGCAGCCACTGGTAAACAGGATTAGCAGAGCGAGGTATG  
TAGGCGGTGCTACAGAGTCTTGAAGTGGTGGCCTAACTACGGCTACACTAGAAGAACAGTATTTGGTATCTGCGCTCTGCTGAAGCCAGTTACCTTCGGAAA  
AAGAGTTGGTAGCTCTTGATCCGGCAAACAACCCAGCTGGTAGCGGTGGTTTTTTTGGTTTGAAGCAGCAGATTACGCGCAGAAAAAAGGATCTCAAGAA  
GATCCTTTGATCTTTTCTACGGGGTCTGACGCTCAGTGGAACGAAAACCTCACGTTAAGGGATTTTGGTTCATGAGATTATCAAAAAGGATCTTCACCTAGATCC  
TTTTAAATTAATAAGTTTTAAATCAATCTAAAGTATATATGAGTAAACTTGGTCTGACAGTTACCAATGCTTAATCAGTGAGGCACCTATCTCAGCGAT  
CTGTCTATTTCTGTTCAATCCATAGTTGCTGACTCCTGCGCAGTCCAAAAAAGGCTCCAAAAAGGAGCCTTAAATGTATCGGTGGGCCCTAGAAAAACTC  
ATCGAGCATCAAAATGAAACTGCAATTTTATTCATATCAGGATTATCAATACCATATTTTGGAAAAAGCCGTTTTCTGTAATGAAGGAGAAAACTCACCGAGGCAG  
TCCATAGGATGGCAAGATCCTGGTATCGGTCTGCGATTCCGACTCGTCCACATCAATACACCTATTAATTTCCCTCGTCAAAAAAAGGTTATCAAGTG  
AGAAATCACCATGAGTGACGACTGAATCCGGTGAGAATGGCAAAGCTTATGCATTTCTTTCCAGACTTGTTCAAACAGGCCAGCCATTACGCTCGTCAAAA  
ATCACTCGCATCAACCAAACCGTTATTCATTCGTGATTGCGCCTGAGCGAGACGAAATACGCGATCGCTGTTAAAAGGACAATTACAAACAGGAATCGAATGC  
AACCGCGCAGGAACACTGCCAGCGCATCAACAATATTTTACCTGAATCAGGATATCTTCTAATACCTGGAATGCTGTTTTCCCGGGGATCGCAGTGGTGA  
GTAACCATGCATCATCAGGAGTACGGATAAAATGCTTGATGGTCCGGAAGAGGCATAAAATCCGTCAGCCAGTTTAGTCTGACCATCTCATCTGTAACATCATT  
GGCAACGCTACCTTTGCCATGTTTCAGAAACAACCTGGCGCATCGGGCTTCCCATACAATCGATAGATTGTGCGCACCTGATTGCCCGACATTATCGCGGAGCC  
CATTATACCCATATAAATCAGCATCCATGTTGGAATTTAATCGCGGCTCGAGCAAGACGTTTCCCGTTGAATATGGCTCATAACACCCCTTGATATTAAGTGT  
TTATGTAAGCAGACAGTTTTTATGTTTCATGATGATATATTTTTATCTGTGCAATGTAACATCAGAGATTTTGAGACACAACGTTGTTTAAACAAATAGTCAA  
AAGCCTCCGGCG

## **References**

1. Chen, M. et al. (2002). *Nature Genetics* **32(4)**: 670-675.
2. Naldini, L., U. Blomer, P. Gally, D. Ory, R. Mulligan, F. H. Gage, I. M. Verma, and D. Trono (1996) *Science* **272**:263-267.
3. Verma, I. M., and N. Somia (1997) *Nature* **389**:239-242
4. Kahl C. A., Marsh J., Fyffe J., Sanders D. A., and K. Cornetta (2004) *J Virol.* **78**:1421-30.
5. White S. M., Renda M., Nam N. Y., Klimatcheva E., Zhu Y., Fisk J., Halterman M., Rimel B. J., Federoff H., Pandya S., Rosenblatt J. D., and V. Planelles (1999) *J Virol.* **73**:2832-40.
6. Kafri T., van Praag H., Ouyang L., Gage F. H., and I. M. Verma (1999) *J Virol.* **73**:576-84.

## **Notice to Purchaser**

This product is sold for research and development purposes only and is not to be incorporated into products for resale without written permission from Cell Biolabs. The patented technology is covered by a license from CHLA and University of Southern California. By the use of this product you accept the terms and conditions of all applicable Limited Use Label Licenses. You may contact our Business Development department at [busdev@cellbiolabs.com](mailto:busdev@cellbiolabs.com) for information on sublicensing this technology.

## **Warranty**

These products are warranted to perform as described in their labeling and in Cell Biolabs literature when used in accordance with their instructions. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THIS EXPRESSED WARRANTY AND CELL BIOLABS DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR PARTICULAR PURPOSE. CELL BIOLABS' sole obligation and purchaser's exclusive remedy for breach of this warranty shall be, at the option of CELL BIOLABS, to repair or replace the products. In no event shall CELL BIOLABS be liable for any proximate, incidental or consequential damages in connection with the products.

## **Contact Information**

Cell Biolabs, Inc.  
7758 Arjons Drive  
San Diego, CA 92126  
Worldwide: +1 858-271-6500  
USA Toll-Free: 1-888-CBL-0505  
E-mail: [tech@cellbiolabs.com](mailto:tech@cellbiolabs.com)  
[www.cellbiolabs.com](http://www.cellbiolabs.com)

©2009-2011: Cell Biolabs, Inc. - All rights reserved. No part of these works may be reproduced in any form without permissions in writing.