

pUNO1-hACE2

Expression vector containing human ACE2 open reading frame

Catalog code: puno1-hace2

<https://www.invivogen.com/human-ace2-expression-vector>

For research use only

Version 20F02-NJ

PRODUCT INFORMATION

Contents

- 20 µg of lyophilized plasmid DNA
- 2 x 1 ml blasticidin at 10 mg/ml

Storage and Stability

- Product is shipped at room temperature.
- Lyophilized DNA should be stored at -20°C.
- Resuspended DNA should be stored at -20°C and is stable at least for 1 year.
- Store blasticidin at 4°C or -20°C. The expiry date is specified on the product label.

Quality control

- Plasmid construct has been confirmed by restriction analysis and full-length open reading frame (ORF) sequencing.
- Plasmid DNA was purified by ion exchange chromatography.

GENERAL PRODUCT USE

• **Subclone gene into another vector.** Two unique restriction sites flank the gene, allowing convenient excision. The 5' site is AgeI which is compatible with XmaI, BspEI, NgoMIV, and SgrAI. The 3' site is NheI which is compatible with XbaI, SpeI, and AvrII.

• **Stable gene expression in mammalian cells.** pUNO1 plasmids can be used directly in transfection experiments both *in vitro* and *in vivo*. pUNO1 plasmids contain the blasticidin-resistance gene (*bsr*) driven by the CMV promoter/enhancer in tandem with the bacterial EM7 promoter. This allows the amplification of the plasmid in *E. coli*, as well as the selection of stable clones in mammalian cells using the same selective antibiotic. pUNO1 allows high levels of expression and secretion of the gene product.

METHODS

• Plasmid resuspension

Quickly spin the tube containing the lyophilized plasmid to pellet the DNA. To obtain a plasmid solution at 1 µg/µl, resuspend the DNA in 20 µl of sterile water. Store resuspended plasmid at -20°C.

• Plasmid amplification and cloning

Plasmid amplification and cloning can be performed in *E. coli* GT116 or other commonly used laboratory *E. coli* strains, such as DH5α.

• Blasticidin usage

Blasticidin should be used at 25-100 µg/ml in bacteria and 1-30 µg/ml in mammalian cells. Blasticidin is supplied as a 10 mg/ml colorless solution in HEPES buffer.

PLASMID FEATURES

• human ACE2

ORF size: 2418 bp

Human ACE2 (angiotensin I-converting enzyme-2) is a type I surface transmembrane protein expressed in arteries, heart, kidneys, and epithelia of the lung and small intestine^{1,2}. ACE2 belongs to the angiotensin-converting enzyme family of dipeptidyl carboxydipeptidases^{2,3}. ACE2 also plays a critical role in the human pathogenesis of the coronavirus disease-19 (COVID-19) caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). Indeed, hACE2 has been described as a receptor for the Spike (S) protein of the SARS-CoV and SARS-CoV-2 coronaviruses, facilitating the viral entry into target cells⁴⁻⁶. As a common cell entry receptor for SARS-CoV and SARS-CoV-2, hACE2 is of major interest to understand the transmissibility of these two coronaviruses, as well as of potential future similar zoonotic viruses.

• **EF-1α/HTLV hybrid promoter** is a composite promoter comprised of the Elongation Factor-1α (EF-1α) core promoter⁷ and the 5' untranslated region of the Human T-Cell Leukemia Virus (HTLV). EF-1α utilizes a type 2 promoter that encodes for a «house keeping» gene. It is expressed at high levels in all cell cycles and lower levels during G0 phase. The promoter is also non-tissue specific; it is highly expressed in all cell types. The R segment and part of the U5 sequence (R-U5') of the HTLV Type 1 Long Terminal Repeat⁸ has been coupled to the EF-1α promoter to enhance stability of DNA and RNA. This modification not only increases steady state transcription, but also significantly increases translation efficiency possibly through mRNA stabilization.

• **SV40 pAn** is the Simian Virus 40 late polyadenylation (pAn) signal enables efficient cleavage and polyadenylation reactions, resulting in high levels of steady-state mRNA⁹.

• **pMB1 ori** is a minimal *E. coli* origin of replication to limit vector size, but with the same activity as the longer Ori.

• **hCMV (human cytomegalovirus) enhancer & promoter** drive the expression of the blasticidin resistance in mammalian cells.

• **EM7** is a bacterial promoter that enables the constitutive expression of the antibiotic resistance gene in *E. coli*.

• ***bsr* (blasticidin resistance gene)** from *Bacillus cereus* encodes a deaminase that confers resistance to the antibiotic blasticidin. The *bsr* gene is driven by the CMV promoter/enhancer in tandem with the bacterial EM7 promoter. Therefore, blasticidin can be used to select stable mammalian cells transfectants and *E. coli* transformants.

• **Human beta-Globin pAn** is a strong polyadenylation (pAn) signal placed downstream of *bsr*. The use of beta-globin pAn minimizes interference¹⁰ and possible recombination events with the SV40 pAn signal.

TECHNICAL SUPPORT

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REFERENCES

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2. Hamming I. *et al.*, 2004. Tissue distribution of ACE2 protein, the functional receptor for SARS coronavirus. *J. Pathol.* 203 :631-637. 3. Donoghue M. *et al.*, 2000. A novel angiotensin-converting enzyme-related carboxypeptidase (ACE2) converts angiotensin I to angiotensin 1-9. *Cir. Research*. 87(5):e1-e9. 4. Li W. *et al.*, 2003. Angiotensin-converting enzyme 2 is a functional receptor for the SARS coronavirus. *Nature*. 426(6965):450-454. 5. Hoffmann M. *et al.*, 2020. SARS-CoV-2 cell entry depends on ACE2 and TMPRSS2 and is blocked by a clinically proven protease inhibitor. *Cell*. 181:1-16. 6. Zhou P. *et al.*, 2020. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature*. 579(7798):270-273. 7. Kim D. *et al.*, 1990. Use of the human elongation factor 1 α promoter as a versatile and efficient expression system. *Gene* 91(2):217-23 8. Takebe Y. *et al.*, 1988. SR alpha promoter: an efficient and versatile mammalian cDNA expression system composed of the simian virus 40 early promoter and the R-U5 segment of human T-cell leukemia virus type 1 long terminal repeat. *Mol Cell Biol*. 8(1):466-72. 9. Carswell S. & Alwine J., 1989. Efficiency of utilization of the simian virus 40 late polyadenylation site: effects of upstream sequences. *Mol Cell Biol*. 9(10):4248-58. 10. Yu J. & Russell J., 2001. Structural and functional analysis of an mRNP complex that mediates the high stability of human β -globin mRNA. *Mol Cell Biol*. 21(17):5879-88.

RELATED PRODUCTS

Product	Description	Cat. Code
Blasticidin	Selection antibiotic	ant-bl-1
ChemiComp GT116	Competent <i>E. coli</i>	gt116-11
pUNO1-hTMPRSS2a	Expression vector	puno1-htp2a
pUNO1-hTMPRSS2b	Expression vector	puno1-htp2b
pUNO1His-SARS2-S	Production vector	p1his-cov2-s
pUNO1Fc-SARS2-S	Production vector	p1fc-cov2-s
pUNO1His-SARS2-S1	Production vector	p1his-cov2-s1
pUNO1Fc-SARS2-S1	Production vector	p1fc-cov2-s1
pUNO1His-SARS2-RBD	Production vector	p1his-cov2-rbd
pUNO1Fc-SARS2-RBD	Production vector	p1fc-cov2-rbd

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