

Improvement To Retroviral Vectors Containing The Human Ubiquitin C Promoter

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SUMMARY

UCLA researchers in the Department of Molecular Biology have developed a lentiviral vector, "pCCLc-roUBC", containing the cellular promoter from the human ubiquitin C gene (UBC), to improve transgene expression in retroviral vectors.

BACKGROUND

Gene delivery into human cells is a promising way to correct or protect against genetic alterations in a variety of human diseases such as hematological malignancies. Various gene transduction systems have been developed, including gamma-retroviral vectors, lentiviral vectors, adenoviral vectors and adeno-associated viral vectors. However, despite the diversity of vector systems, cell transduction and transgene expression efficiency can still be too low for therapeutic efficacy. Thus, high-level expression of transgenes in the majority of target cells remains a significant challenge for gene transfer technology.

INNOVATION

UCLA researchers have developed a lentiviral vector, "pCCLc-roUBC", that addresses potential needs for higher transgene expression in lentiviral vectors that contain internal promoters. This human ubiquitin C (UBC) promoter is oriented in a reverse orientation so that the direction of transcription from the said promoter is oriented towards the 5' long terminal repeat (LTR). Upon lentiviral transduction of target cells, this roUBC vector retains its intron and expresses transgenes at an approximately four-fold higher level than vectors with a UBC promoter oriented such that transcription progressed towards the 3' LTR. The UBC promoter direction reversal also improves expression from bidirectional vectors, which is demonstrated by the increased expression of EGFP in a bidirectional vector with a reversed UBC promoter in comparison to the forward oriented counterpart. The utility of this promoter orientation is not limited to the PCCLc lentiviral vector and would be beneficial in other lenti- and retroviral vectors as well.

APPLICATIONS

- ▶ Gene delivery
- ▶ Lentiviral vectors

ADVANTAGES

- ▶ Transgene expression four-fold higher than vectors containing UBC promoter with different (forward) orientation
- ▶ Improves expression from bidirectional vectors, increased expression of EGFP

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20180185415	07/05/2018	2015-450

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ Augmentations to Lentiviral Vectors to Increase Expression
- ▶ Generation Of Minimal Enhancer Elements Using Massively Parallel Reporter Assays
- ▶ Optimized Lentiviral Vector for Stem Cell Gene Therapy of Hemoglobinopathies
- ▶ Transient Expression Of BCL-2 To Ameliorate Cytotoxicity Of Gene Modification Reagents In Stem Cells

CONTACT

UCLA Technology Development Group
 ncd@tdg.ucla.edu
 tel: 310.794.0558.



INVENTORS

- ▶ Kohn, Donald B.

OTHER INFORMATION

KEYWORDS

gene delivery, transgene expression, retroviral vectors, lentiviral vector, pCCLc-roUBC, human ubiquitin C (UBC), long terminal repeat (LTR), bidirectional vectors, bone marrow, hematopoietic stem cells, mesenchymal stem cells

CATEGORIZED AS

- ▶ **Medical**
 - ▶ Delivery Systems
 - ▶ Disease: Cancer
 - ▶ Gene Therapy
 - ▶ Therapeutics

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UCLA Technology Development Group

10889 Wilshire Blvd., Suite 920, Los Angeles, CA 90095

tdg.ucla.edu

Tel: 310.794.0558 | Fax: 310.794.0638 | ncd@tdg.ucla.edu

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