

Request Information

Permalink

## In Vitro Reconstituted Plant Virus Capsids For Delivering Rna Genes To Mammalian Cells

Tech ID: 30282 / UC Case 2014-111-0

### SUMMARY

UCLA researchers in the Department of Chemistry & Biochemistry have developed a method for using in vitro reconstituted plant virus-derived vectors to package and deliver RNA genes for targeted delivery of vaccines, MRI contrast agents, and therapeutic proteins in RNA form.

### BACKGROUND

The development of RNA-based drugs has been slow due to challenges in delivering RNA to target cells. Some of these involve safety concerns, since RNA drugs cannot be controlled after application. Also, bioavailability is a challenge due to the endogenous presence of RNases that will degrade RNA drugs. Current methods utilizing nanocarriers or liposomes have often resulted in inefficient targeting, as endosomal degradation can also occur. Therefore, RNA delivery requires efficient targeting to the proper cell and the ability to avoid degradation.

### INNOVATION

Researchers at UCLA have discovered that cowpea chlorotic mottle virus (CCMV) capsid proteins have the unique ability to spontaneously self-assemble around heterologous RNA molecules of widely varying length and sequence. RNA in these nucleocapsids are protected from degradation and are able to release the RNA in the cytoplasm of target mammalian cells. Additionally, a ligand that binds to target cells can be conjugated to the capsid to facilitate cytoplasmic entry of RNA-containing nucleocapsids.

### APPLICATIONS

- ▶ The packaged gene of interest that contains a replicon can be used to deliver a self-amplifying RNA gene for targeted delivery of vaccines, MRI contrast agents, and other therapeutic proteins in RNA form

### ADVANTAGES

- ▶ Delivery of genes to mammalian cells within the capsid of a self-assembling plant virus is advantageous to packaging them in mammalian viruses or liposomes, avoiding the use of cell cultures
- ▶ Nucleocapsids containing an RNA gene of interest with replicon RNA can be expressed up to one million-fold in mammalian cells
- ▶ This method provides monodisperse, well-defined, and robust particles that are functionalized for targeting of and uptake by mammalian cells

### PATENT STATUS

| Country                  | Type          | Number     | Dated      | Case     |
|--------------------------|---------------|------------|------------|----------|
| United States Of America | Issued Patent | 10,221,399 | 03/05/2019 | 2014-111 |
| United States Of America | Issued Patent | 9,605,031  | 03/28/2017 | 2014-111 |

### ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Sustained Intracellular RNA Delivery and Expression](#)

### CONTACT

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



### INVENTORS

- ▶ Gelbart, William M.

### OTHER INFORMATION

#### KEYWORDS

RNA-drug delivery, RNA vaccine delivery, targeted drug therapy, RNA-containing MRI contrast agents, in-vitro reconstituted plant virus capsids, nucleocapsids for drug delivery, delivering RNA to mammalian cells

#### CATEGORIZED AS

- ▶ **Medical**
  - ▶ Delivery Systems
  - ▶ Therapeutics
- ▶ **Research Tools**
  - ▶ Nucleic Acids/DNA/RNA

#### RELATED CASES

2014-111-0

**UCLA Technology Development Group**

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

<https://tdg.ucla.edu>

Tel: 310.794.0558 | Fax: 310.794.0638 | [ncd@tdg.ucla.edu](mailto:ncd@tdg.ucla.edu)

© 2019, The Regents of the University of California

[Terms of use](#)

[Privacy Notice](#)

