



# Multivalent Targeting Strategy for Drug Carriers

Tech ID: 20357 / UC Case 2009-233-0

## SUMMARY

UCLA investigators developed a multivalent targeting strategy to modify drug carriers and enhance its targetability, sensitivity, and overall efficiency. This method involves the modification of drug-loaded nanoparticles, and has potential uses for drug delivery, imaging and medical applications.

## BACKGROUND

Ligand binding to the surface of drug carriers has been explored as a way of enhancing targetability and overall efficiency of drug delivery and imaging applications. Multivalent binding to imaging agents has been investigated and has been demonstrated to increase targeting over monovalent binding. However, multivalent ligand binding to enhance targeting of drug-loaded nanoparticles has not been investigated. Therefore, there is a need to investigate the effect of multivalent binding to drug-loaded nanoparticles.

## INNOVATION

Researchers at UCLA have identified a multivalent targeting strategy that increased the targeting efficiency and specificity of drug carriers toward targeted cells. This strategy involves spatially constraining ligands, so that the ligands are presented as clusters rather than single molecules. The method involves the modification of DNA loaded nanoparticles with the ligand clusters. This type of an approach has been shown to be more effective at targeting cancer cells with high expressions of integrin receptors and more effective at delivering genes compared to drug carriers with homogeneously distributed ligands. Because of the enhanced targeting and gene transfer efficiency, it is believed that this approach is ideal for the delivery of nucleic acid based drugs.

## APPLICATIONS

- ▶ Increase the targeting efficiency and specificity of drug carriers towards targeted cells by using multivalent ligand binding
- ▶ Potential uses for drug delivery and imaging applications
- ▶ Potential that any drug carrier particle can be modified by this technique to enhance its targeting and efficacy

## ADVANTAGES

- ▶ Enhanced targeting of the cell type of interest
- ▶ Non-viral approach
- ▶ Potential to take any drug carrier particle and modify with multivalent ligands
- ▶ Modified drug carriers are more sensitive to receptors on the targeted cell surface

## STATE OF DEVELOPMENT

Inventors have demonstrated their strategy in vitro using RGD and DNA/PEI polyplexes.

## PATENT STATUS

| Country                  | Type          | Number    | Dated      | Case     |
|--------------------------|---------------|-----------|------------|----------|
| United States Of America | Issued Patent | 8,263,133 | 09/11/2012 | 2009-233 |

## CONTACT

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## INVENTORS

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## OTHER INFORMATION

### KEYWORDS

drug delivery, non-viral, multivalent  
targeting, drug carriers, imaging  
applications, nanoparticles, ligands

### CATEGORIZED AS

- ▶ Medical
  - ▶ Delivery Systems
  - ▶ Gene Therapy
  - ▶ Therapeutics

### RELATED CASES

2009-233-0

RELATED MATERIALS

► [Protein-polymer nanoparticles for nonviral gene delivery. Biomacromolecules \(2011\).](#)

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

► [Hydrogel For Engineered Immune Response](#)

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