

# New Effective Low-Cost Vaccines

Tech ID: 25787 / UC Case 2010-315-0

## BACKGROUND

Enteric disease and respiratory diseases are major problems worldwide which greatly impact human health, as well as animal health. Current vaccine approaches are limited by numerous factors, including production costs, efficacy, safety, requirement of adjuvants, and storage conditions.

## TECHNOLOGY DESCRIPTION

UCSD researchers have engineered diatoms (algae) to express pathogenic antigens on the cell surface, which induce protective immunity suitable for use as vaccines against such pathogens. In addition to providing an expression platform, the diatom structure provides an endogenous adjuvant activity.

## APPLICATIONS

Algae-based vaccines could provide a broadly based, completely new, innovative, inexpensive high production vaccine system for numerous infectious diseases, including bovine respiratory disease, which causes significant economic losses for the cattle industry.

## ADVANTAGES

Traditional vaccine approaches have many limitations. For example, killed pathogen vaccines are expensive, require additional adjuvants, multiple doses, and often have undesirable side effects. Live modified or recombinant attenuated bacterial or virus vectored vaccines may revert to virulence. In contrast, algae-based vaccines expressing an antigen may be less expensive, and carry endogenous adjuvant activity.

## STATE OF DEVELOPMENT

UCSD researchers have preliminary data demonstrating in vitro that the diatoms stimulate monocytes in peripheral blood to produce TNF alpha. These data indicate that immune responses are stimulated by the algae, as seen by activation of these early antigen presenting cells. In addition, researchers have generated expression vectors and demonstrated expression of foreign proteins on the algae cell surface, as well as high level intracellular expression.

## INTELLECTUAL PROPERTY INFO

This technology is available for licensing.

Claim 1: A diatom comprising a nucleic acid encoding an antigen heterologous to the diatom, wherein the antigen is expressed as a fusion protein with a surface-expressed polypeptide endogenous to the diatom selected from a frustulin and p150 cell surface protein, wherein the fusion protein is attached to the surface of the diatom, wherein the diatom is an intact cell.

## PATENT STATUS

| Country                  | Type          | Number    | Dated      | Case     |
|--------------------------|---------------|-----------|------------|----------|
| United States Of America | Issued Patent | 9,358,283 | 06/07/2016 | 2010-315 |

## CONTACT

University of California, San Diego  
Office of Innovation and Commercialization  
[innovation@ucsd.edu](mailto:innovation@ucsd.edu)  
tel: 858.534.5815.



## OTHER INFORMATION

### KEYWORDS

diatoms, algae, vaccines, adjuvant,  
bovine, veterinary

### CATEGORIZED AS

- **Agriculture & Animal Science**
  - Animal Science
- **Medical**
  - Disease: Respiratory and Pulmonary System
  - Vaccines

### RELATED CASES

2010-315-0

University of California, San Diego  
Office of Innovation and Commercialization  
9500 Gilman Drive, MC 0910, ,  
La Jolla,CA 92093-0910

Tel: 858.534.5815  
innovation@ucsd.edu  
<https://innovation.ucsd.edu>  
Fax: 858.534.7345

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