



# Improved Pertussis Vaccine

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## Bordetella pertussis Vaccine Targets Iron Receptors

*Bordetella pertussis* (*Bp*) is the bacterial agent of pertussis (whooping cough) in humans. Current acellular pertussis vaccines, which target only a narrow range of *Bp* virulence factors, lack efficacy in preventing respiratory tract colonization or disease transmission. *Bp* cell surface iron receptors are essential for the uptake of iron and are critical for growth in the host. New methods targeting *Bp* iron receptors have the potential to improve pertussis vaccine efficacy. Receptor-based vaccines would elicit the production of antibodies that could block iron uptake, starving *Bp* for iron and thus preventing growth. Further, they could enhance immune recognition of *Bp* for elimination by the host immune system.

This technology uses *Bp* receptor proteins required for the uptake of iron sources:

1. The receptor proteins can be added to existing pertussis vaccine formulations to improve efficacy.
2. Novel protein scaffold technology displays the antigenic regions of iron receptor proteins, yielding highly immunogenic, polymeric, potentially multivalent vaccine antigens.
3. Production of the receptors in *Bp* is stimulated by specific growth conditions resembling the host environment, yielding bacteria for use in improved whole cell pertussis vaccines.

## Acellular, Whole-cell and Veterinary Vaccines

This approach targets iron receptor proteins essential for growth, instead of virulence factors that are dispensable. *Bp* iron receptor proteins are recognized by the immune system, and adding these proteins (or regions of those proteins) to a vaccine formulation stimulates the immune system to target those receptors. This effectively prevents *Bp* bacteria from obtaining the iron necessary to live and multiply, and improves immune recognition for clearance. Both acellular pertussis vaccines and whole cell pertussis vaccines (used in many countries) could benefit. In addition, the technology can be applied to veterinary vaccines for diseases caused by other *Bordetella* species, such as canine kennel cough, feline bordetellosis or atrophic rhinitis.

### BENEFITS AND FEATURES:

- Increases efficacy of both acellular and whole-cell pertussis vaccines
- Targets *Bp* iron receptors
- Blocks the iron uptake pathway necessary for *Bp* survival
- Generates an improved immune response for *Bp* recognition and clearance

### APPLICATIONS:

- Improved acellular pertussis and whole-cell pertussis vaccines
- Veterinary vaccines for diseases (e.g., kennel cough, atrophic rhinitis) caused by other *Bordetella* species
- Method for producing chimeric antigens on a protein scaffold may be adapted to generate vaccines for other pathogens

**Phase of Development** - Proof of concept

## Technology ID

20160135

## Category

Life Sciences/Biologics

Life Sciences/Human Health

Life Sciences/Pharmaceuticals

Agriculture &

Veterinary/Veterinary Medicine

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