

**Technology**

Method for identifying, isolating, and altering virulence genes of *Mycobacterium* species

**Inventor**

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**Key Features**

- Multiple applications including vaccine development and drug development
- Potential for increased efficacy compared to existing vaccines
- Potential for improved safety profiles compared to existing vaccines

**Stage of Development**

Reduced to practice with successful demonstration in both *in vitro* and animal models

**Keywords**

Therapeutic  
- Tuberculosis  
- Vaccine  
- *Mycobacterium*  
- Gene  
- Drug target

**Patent Status**

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## Virulence Genes of *M. marinum* and *M. tuberculosis* (VA Reference No. 00-005)

*Novel method for identifying, isolating, and altering virulence genes of Mycobacterium species*

**Technology**

The Department of Veterans Affairs has developed methods to identify and isolate virulence genes of *Mycobacterium marinum*, a bacterium causing tuberculosis in fish, and *Mycobacterium tuberculosis*, the primary etiologic agent of human tuberculosis, as well as other virulent species. In addition, the methods developed can be used to alter virulence genes by deletion and thereby generate and isolate avirulent strains. Furthermore, the invention relates to the isolated virulence genes, to the variants and fragments of these genes, to the mutant, avirulent mycobacteria in which they have been created, and to attenuated vaccines comprising the mutant bacteria.

**Description**

The technology developed by the VA is a method of designing and producing a potential vaccine for use against TB in both humans and animals. The technology is based on sound scientific research and has benefited from and exploited in research in the sequencing of the *M. tuberculosis* genome. In addition, genes encoding enzymes essential for *in vivo* survival of *Mycobacterium* in its host have also been identified suggesting the possibility that the genes upon which the present invention is based, could be used as drug targets for identifying new drugs to treat *M. tuberculosis* infection.

**Competitive Advantage**

The only vaccine approved, and generally accepted, for human use is the bacillus of Calmette and Guérin (BCG). However, the BCG vaccine exhibits two significant problem areas: safety and efficacy. According to the United States Advisory Council for the Elimination of Tuberculosis, the BCG vaccination is now reserved for selected people meeting specific criteria, such as children living in environments where they are at high risk of contracting tuberculosis.

This invention:

- Could lead to a more efficacious vaccine with an improved safety profile.
- Could be used to identify drug targets for development of new therapeutic agents.

**Status**

The Department of Veterans Affairs is looking for a partner for further development and commercialization of this technology through a license, and the VA inventors are available to collaborate with interested companies through a Cooperative Research and Development Agreement (CRADA).