

Insertion of Foreign Genes in Rubella Virus with Stable Expression in a Live, Attenuated Viral Vaccine

Technology Summary

Rubella virus (RUB) is the only member of the Rubivirus genus of the family Togaviridae. Live, attenuated rubella vaccine has been used successfully for many years. By expressing additional viral antigens in rubella, we can expand its range and utility as a live, replicating viral vector. Earlier efforts at expressing foreign genes in rubella virus failed due to instability of the insert. Limitations on insert size and stability restricted rubella's ability to express exogenous antigens and immunize against other viruses.

FDA inventors have found a way to insert foreign genes into a rubella virus that enables stable expression over many passages of the virus. Based on an earlier observation that rubella virus can tolerate a small deletion in the nonstructural genes and still replicate normally, the inventors' used this deletion to insert a foreign gene. The inventors discovered a new way to use the already-approved rubella vaccine as a viral vector to express the additional protein antigens of a second (or multiple other) virus. This is highly advantageous because it allows for production of a live virus vaccine when attenuation is not possible for highly virulent viruses such as HIV.

Another advantage of this vaccine is that virus titers in cell culture reach one thousand (1000) human doses per milliliter (ml) of culture supernatant, enabling production of millions of doses for the developing world. In the developed world, this vaccine could be substituted for the current vaccine at almost no cost and used to immunize against rubella plus the inserted antigen(s). Without vaccination, the average age of becoming seropositive for rubella is approximately nine (9) years old. This new vaccine could be given to one to two-year olds with a booster at nine years old. Additionally, this vaccine is already approved, so the safe and immunogenic doses are already known.

Potential Commercial Applications

- Vaccines for the prevention of rubella and other indications
- Use of rubella vector for expression of foreign genes
- Based on already FDA approved rubella vaccine

Competitive Advantages

- Novel vaccine candidate
- Rapid production time

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