

Measles Virus as a Vector for the HPV Vaccine Development

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ABSTRACT

The Human Papilloma Virus (HPV) vaccine prevents infection with certain species of human papillomavirus associated with the development of cervical cancer, genital warts and some less common cancers. But, the development of vaccine that prevents HPV infection represents an important opportunity to prevent cervical cancer whilst a therapeutic immunization would be valuable in treating premalignant and malignant disease. Attenuated MV strains are highly efficient and safe vaccines, typically preventing recipients from Measles for their entire life. To benefit from these extraordinary vaccination properties in the present study MV cDNA plasmids have been constructed to produce precisely initiated and terminated MV anti-genome related to the Edmonston B vaccine strains. These transgenes were expressed at different levels, according to their genomic position and were stably maintained over many viral generations. The ability to construct new recombinant and chimeric MVs opens the prospect to develop new vaccines based on MV. In an effort to generate an inexpensive candidate HPV vaccine with improved prophylactic potential, a MV vector based on Berna-commercial Measles vaccine strain (Edmonston-Zagreb) inducing against HPV was developed.

Keywords: Recombinant vaccines; Viral vectors; Protein expression; cDNA

DESCRIPTION

Modern approaches in vaccinology and immunology have led to the discovery of a number of antigens potentially allowing addressing complex diseases such as AIDS, cancer and malaria, if administered in an appropriate way. Therefore, the establishment of potent antigen delivery systems became essential for the progress in this field. The use of live attenuated viral vectors appears promising especially since multiple antigens can efficiently be presented to the immune system. Attenuated Measles Virus (MV) vaccine represents a number of essential features for the development of candidate prophylactic and therapeutic vaccines. Among these features are safeties, immunogenicity and cost effectiveness of the recombinant vaccines.

MV belongs to the genus Morbillivirus in the family Paramyxoviridae. It is an enveloped virus with a long nonsegmented RNA genome of negative polarity [1]. In 1954, Enders and Peebles inoculated primary human kidney cells with the blood of David Edmonston, a child with measles and the resulting Edmonston strain of MV was subsequently adapted to growth in a variety of cell lines. Adaptation to chicken embryos, chick embryo fibroblasts (CEF), and/or dog kidney cells and human diploid cells produced the attenuated Edmonston A and B, Zagreb (EZ) and AIK-C seeds [2].

Edmonston-B was licensed in 1963 as the first MV vaccine. However, being reactogenic it was abandoned in 1975. Further passages of Edmonston A and B on CEF produced the more attenuated Moraten vaccines [3]. Today, the Schwarz/Moraten, AIK-C and EZ vaccines are commonly used. An MV vaccine induces a lifelong immunity after a single or two low-dose injections. Persistence of antibodies and CD8 cells has been shown for as long as 25 years after vaccination. MV vaccines are easily produced on a large scale in most countries and can be distributed at low cost. Because the attenuation of MV genome results from an advantageous combination of numerous mutations, the vaccine is very stable and reversion to pathogenicity has never been observed. Regarding safety, MV replicates exclusively in the cytoplasm, ruling out the possibility of integration into host DNA. These characteristics make live attenuated MV vaccine an attractive candidate for use as a multivalent vaccination vector.

A reverse genetics system for MV was established allowing the rescue of infectious MV from cloned cDNA [4]. Additional MV-specific transcription units containing multiple cloning sites were introduced into the MV antigenome (i.e. cDNA sequence) allowing the addition and simultaneous expression of several exogenous genes. Genes from Hepatitis B Virus (HBV), Simian or Human Immunodeficiency Viruses (SIV, HIV), Mumps virus (MV), West

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Nile Virus (WNV) and human IL12 were inserted and expressed from different loci of the MV genome. Here we show that multiple marker genes coding for Chloramphenicol Acetyltransferase (CAT), Green Fluorescent Protein (GFP) and Betagalactosidase (B-gal) can be expressed simultaneously by the same progeny. In addition, recombinant MVs expressing single or multiple antigens of SIV induced strong and enduring humoral immune responses in experimental animals.

REFERENCES

1. Enders JF, Peebles TC. Propagation in tissue cultures of cytopathogenic agents from patients with measles. *Proc Soc Exp Biol Med.* 1954; 86:277-286.
2. Hilleman MR. Current overview of the pathogenesis and prophylaxis of measles with focus on practical implications. *Vaccine.* 2002; 20:651-665.
3. Rota J, Wang Z, Rota AP, Bellini W. Comparison of sequences of the H, F and N coding genes of measles virus vaccine strains. *Virus Res.* 1994; 31:317-330.
4. Schwarz A. Preliminary tests of a highly attenuated measles vaccine. *Am J Dis Child.* 1962; 103:216-219.