

Immunomodulatory strategies for Parapoxvirus: current status and future approaches for the development of vaccines against Orf virus infection

ABSTRACT

Orf virus (ORFV), the prototype species of the parapoxvirus genus, is the causative agent of contagious ecthyma, an extremely devastating skin disease of sheep, goats, and humans that causes enormous economic losses in livestock production. ORFV is known for its ability to repeatedly infect both previously infected and vaccinated sheep due to several immunomodulatory genes encoded by the virus that temporarily suppress host immunity. Therefore, the development of novel, safe and effective vaccines against ORFV infection is an important priority. Although, the commercially licensed live-attenuated vaccines have provided partial protection against ORFV infections, the attenuated viruses have been associated with major safety concerns. In addition to safety issues, the persistent reinfection of vaccinated animals warrants the need to investigate several factors that may affect vaccine efficacy. Perhaps, the reason for the failure of the vaccine is due to the long-term adaptation of the virus in tissue culture. In recent years, the development of vaccines against ORFV infection has achieved great success due to technological advances in recombinant DNA technologies, which have opened a pathway for the development of vaccine candidates that elicit robust immunity. In this review, we present current knowledge on immune responses elicited by ORFV, with particular attention to the effects of the viral immunomodulators on the host immune system. We also discuss the implications of strain variation for the development of rational vaccines. Finally, the review will also aim to demonstrate future strategies for the development of safe and efficient vaccines against ORFV infections.

Keyword: Parapoxvirus; Vaccine; Immunomodulators; Vaccination; Orf virus