Chariot Innovations

+44 (0)20 7927 2678
info@chariotinnovations.co.uk
chariotinnovations.co.uk

London School of Hygiene
& Tropical Medicine
Keppel Street
London WC1E 7HT

ECRA vaccines for African Horse Sickness

Summary

African Horse Sickness (AHS) is an arthropod-borne viral disease with a mortality rate of over 75% upon infection. With virulence across Africa, Europe & regions of Asia; AHS remains the most economically significant equine disease worldwide.

Live-attenuated virus vaccines are routinely used to combat AHS. However, these vaccines are costly to produce, do not target every strain of virus and carry risks in safety & transport. A replication-deficient form of the virus has been developed at LSHTM as a vaccine which provide great advancement in the treatment and control of AHS.

Applications

- A vaccine for African horse sickness.

Benefits

- Safe - ECRA vaccines cannot revert to virulence.
- Established vaccine system in horses.
- Lower production and transport costs.
- Complete serotype coverage – Vaccine can be applied as cocktail to target different serotypes.

Background

African Horse Sickness Virus (AHSV), the pathogen responsible for AHS is vectored by biting midges and exists as nine serotypes (AHSV1-9). AHSV is endemic to Sub-Saharan Africa, though periodic outbreaks have occurred in the Middle East, Europe & Southeast Asia. In order to control the disease vaccination with a polyvalent live-attenuated vaccine (LAV) is currently used but it is considered to be unsafe due to the possibility of virulent revertants and the potential of reassortment between LAV and wild-type AHSV strains. Furthermore, LAV vaccines lack complete serotype coverage and because LAVs are infectious they require a higher biosafety level of production and transportation, therefore are costly.

The Roy group have developed a novel form of AHS vaccine using **E**ntry **C**ompetent **R**eplication **A**bortive (ECRA) viruses. These viruses are deficient in the viral replication machinery allowing them to enter host cells but without replicating and spreading in animals. Instead, ECRA viruses will enter cells and only go a single round of viral mRNA synthesis consequently leading to an immune response.

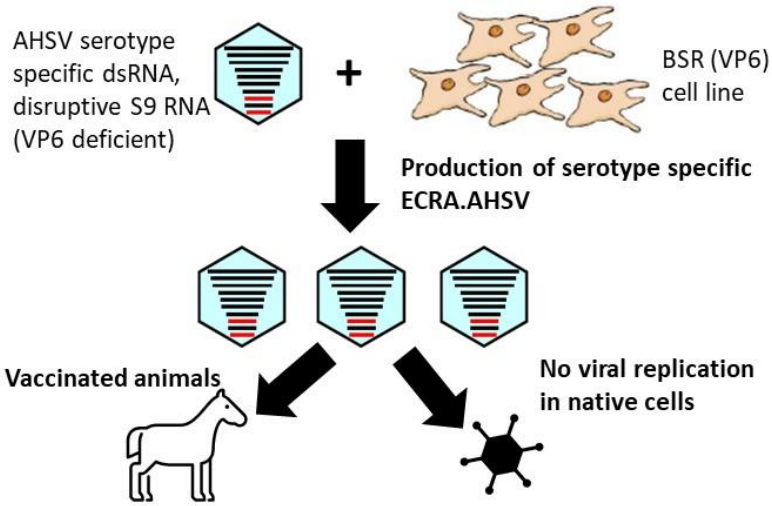
Technology and its advantages

The genome of AHSV is composed of 10 double stranded RNA (dsRNA) segments, with dsRNA S9 responsible for encoding the virus replication protein (VP6). In order to create ECRA vaccines, dsRNA segments with disruptive S9 RNA (VP6 deficient) are transfected into a complementary cell line that already

+44 (0)20 7927 2678
info@chariotinnovations.co.uk
chariotinnovations.co.uk

London School of Hygiene
& Tropical Medicine
Keppel Street
London WC1E 7HT

expresses VP6 in *trans.* This way ECRA viruses can only amplify in the complementary cell line but not in any native host cell.



The nature of ECRA vaccines serve great advantage over the current form of LAVs in that:

- ECRA vaccines are safe as they cannot replicate independently.
- Lower production costs and they require lower biosafety level of production.
- Cocktail administration to target different serotypes.
- No adjuvant required, therefore lesser side effects compared to previously used inactivated vaccines.
- Efficacious and safe to use in animals (no reported adverse effects and raised sustainable immunity against AHSV).

Team

Prof. Polly Roy MSc PhD FMedSci OBE is the lead inventor of this technology. She is currently a Professor of Virology in the Department of Pathogen Molecular Biology at LSHTM. For the last three decades, the predominant subject of Roy's work, although not exclusively, has been AHSV and related Bluetongue Virus (BTV). Roy has made significant contributions to understanding the basic molecular and cell biology, atomic structure, mechanisms of virus entry, genome synthesis, RNA packaging, capsid assembly, egress and cell-to cell transmission of these viruses.

Intellectual Property

The technology is protected by a portfolio of patents PCT/GB2017/050994.