Transboundary and Emerging Diseases

Transboundary and Emerging Diseases

ORIGINAL ARTICLE

Development of a Microsphere-based Immunoassay for Serological Detection of African Horse Sickness Virus and Comparison with Other Diagnostic Techniques

A. Sánchez-Matamoros[1,2,3], C. Beck[4], D. Kukielka[5], S. Lecollinet[4], S. Blaise-Boisseau[4], A. Garnier[4], P. Rueda[6], S. Zientara[4] and J. M. Sánchez-Vizcaíno[1,2]

[1] VISAVET Health Surveillance Centre, Universidad Complutense de Madrid, Madrid, Spain
[2] Animal Health Department, Universidad Complutense de Madrid, Madrid, Spain
[3] CEI Campus Moncloa, UCM-UPM, Madrid, Spain
[4] French Agency for Food, Environmental and Occupational Health and Safety (ANSES), Animal Health Laboratory, UPEC, UMR 1161 INRA, ANSES, ENVA, Maisons-Alfort, France
[5] Microbiology Area, Pharmacy Faculty, San Pablo CEU University, Madrid, Spain
[6] Inmunología y Genética Aplicada, S.A. (INGENASA), Madrid, Spain

Keywords:
African horse sickness; antibody detection; bead-based multiplex immunoassay; diagnosis; serology

Correspondence:
A. Sánchez-Matamoros. VISAVET Health Surveillance Centre, Universidad Complutense Madrid, Av. Puerta del Hierro, s/n, 28040 Madrid, Spain. Tel.: +34 913943702; Fax: +34 913943908; E-mail: almudena@sanidadanimal.info

Received for publication September 17, 2014

doi:10.1111/tbed.12340

Summary

African horse sickness (AHS) is a viral disease that causes high morbidity and mortality rates in susceptible *Equidae* and therefore significant economic losses. More rapid, sensitive and specific assays are required by diagnostic laboratories to support effective surveillance programmes. A novel microsphere-based immunoassay (Luminex assay) in which beads are coated with recombinant AHS virus (AHSV) structural protein 7 (VP7) has been developed for serological detection of antibodies against VP7 of any AHSV serotype. The performance of this assay was compared with that of a commercial enzyme-linked immunosorbent assay (ELISA) and commercial lateral flow assay (LFA) on a large panel of serum samples from uninfected horses (n = 92), from a reference library of all AHSV serotypes (n = 9), on samples from horses experimentally infected with AHSV (n = 114), and on samples from West African horses suspected of having AHS (n = 85). The Luminex assay gave the same negative results as ELISA when used to test the samples from uninfected horses. Both assays detected antibodies to all nine AHSV serotypes. In contrast, the Luminex assay detected a higher rate of anti-VP7 positivity in the West African field samples than did ELISA or LFA. The Luminex assay detected anti-VP7 positivity in experimentally infected horses at 7 days post-infection, compared to 13 days for ELISA. This novel immunoassay provides a platform for developing multiplex assays, in which the presence of antibodies against multiple ASHV antigens can be detected simultaneously. This would be useful for serotyping or for differentiating infected from vaccinated animals.

Introduction

African horse sickness (AHS) is a highly fatal vectorborne disease of horses. Its severity and rapid spread led to its registration as a World Organization for Animal Health (OIE)-listed disease (OIE, 2012). While AHS is endemic in sub-Saharan Africa, the virus has repeatedly spread beyond this region, causing an important socio-economic impact in affected countries (Portas et al., 1999; Sánchez-Vizcaíno, 2004). Presently, the disease is limited to endemic areas. However, the rise of the vector distribution due to climate change (Maclachlan and Guthrie, 2010), the increasing

© 2015 Blackwell Verlag GmbH • Transboundary and Emerging Diseases.