Development of a magnetic bead microarray for simultaneous and simple detection of four pestiviruses

LeBlanc N., Gantelius J., Schwenk J.M., Stahl K., Blomberg J., Andersson-Svahn H., Belak S.

Joint R and D Division, Departments of Virology, The National Veterinary Institute (SVA), SE-751 89 Uppsala, Sweden; Department of Nanobiotechnology, Royal Institute of Technology (KTH), SE-106 91 Stockholm, Sweden; Department of Proteomics, Royal Institute of Technology (KTH), SE-106 91 Stockholm, Sweden; Section of Virology, Department of Medical Sciences, Uppsala University Hospital, SE-751 85 Uppsala, Sweden

Abstract: This study reports a novel method for the rapid detection and identification of the four recognized species in the pestivirus genus of the Flaviviridae family, i.e. classical swine fever virus (CSFV), border disease virus (BDV), bovine viral diarrhoea virus type 1 (BVDV1) and type 2 (BVDV2). The analysis of pestivirus PCR products was performed on microarrays by means of magnetic bead detection. The process utilizes an oligonucleotide array, onto which 5′ biotinylated PCR products were hybridized, followed by visualization with streptavidin-coated magnetic particles by the naked eye, microscope or biochip reader. The assay was tested on a collection of pestiviruses that included all four species and allowed a specific and sensitive detection. Sensitivity was compared with other post-PCR detection methods, namely gel electrophoresis and suspension microarray. The results indicate that due to its high sensitivity, specificity and simple detection procedure, the magnetic bead assay provides a powerful tool for detection and identification of viral pathogens. Considering the simplicity of the assay, the protocols for hybridization and magnetic bead detection offer an emerging application for molecular diagnoses in virology that is amenable for use in a modestly equipped laboratory.

Author Keywords: BDV; BVDV1; BVDV2; CSFV; Magnetic bead; Microarray; PCR; Pestivirus

Year: 2009
Source title: Journal of Virological Methods
Volume: 155
Issue: 1
Page : 1-9
Cited by: 6
Link: Scorpus Link
Document Type: Article
Source: Scopus

Authors with affiliations:

1. LeBlanc, N., Joint R and D Division, Departments of Virology, The National Veterinary Institute (SVA), SE-751 89 Uppsala, Sweden, Section of Virology, Department of Medical Sciences, Uppsala University Hospital, SE-751 85 Uppsala, Sweden
2. Gantelius, J., Department of Nanobiotechnology, Royal Institute of Technology (KTH), SE-106 91 Stockholm, Sweden
3. Schwenk, J.M., Department of Proteomics, Royal Institute of Technology (KTH), SE-106 91 Stockholm, Sweden

4. Ståhl, K., Joint R and D Division, Departments of Virology, The National Veterinary Institute (SVA), SE-751 89 Uppsala, Sweden
5. Blomberg, J., Section of Virology, Department of Medical Sciences, Uppsala University Hospital, SE-751 85 Uppsala, Sweden
6. Andersson-Svahn, H., Department of Nanobiotechnology, Royal Institute of Technology (KTH), SE-106 91 Stockholm, Sweden
7. Belák, S., Joint R and D Division, Departments of Virology, The National Veterinary Institute (SVA), SE-751 89 Uppsala, Sweden