

Europium Nanoparticle Improve a Rapid Diagnostic Application of Monoclonal Antibodies against Avian Influenza H7 Subtype

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Extended Abstract

The frequent recurrence of highly pathogenic avian influenza A virus H7 subtype in human infection. The development of a sensitive and rapid diagnostic test is urgently needed for early detection of avian influenza (AI) H7 subtype. Although the rapid point-of-care detection tests (POCT) are not generally performed for avian influenza because of sensitivity limitations to detect AI virus, there are several ongoing investigations for looking for H7 subtype-sensitive or specific POCT because of useful convenience as on-site apply in field. In this study, novel monoclonal antibodies (mAbs) against influenza A H7N9 recombinant hemagglutinin-1 (rHA-1) were developed and applied to a Europium nanoparticle–based rapid fluorescent immunochromatographic strip test (FICT). The pairing of antibody (2F4 and 6D7) for H7 subtype specificity was confirmed by dot-FICT, and H7 subtype-specificity of those antibodies was confirmed by immunofluorescence assay and western blot analysis. By optimization of conjugate and pH of lysis buffer, FICT assay possessed the H7 subtype-specificity. The limit of detection of FICT employing novel mAbs was detecting 31 ng/mL of H7N9 HA-1 and 40 HAU/mL of H7 subtype virus. Europium-based FICT exhibited 25-fold improvement by comparison of colloidal gold-based rapid diagnostic kit. In conclusion, FICT assay by the employment of Europium nanoparticle with H7 subtype-specific 2F4 and 6D7 mAbs could improve the performance of rapid diagnostic system. As Europium nanoparticle application to H7 subtype-specific rapid diagnostic system achieved the near limit of detection of rRT-PCR, the FICT assay could be useful as on-site monitoring system.