Rapid magnetic particles-based enzyme immunoassay for the quality control of Glycyrrhiza spp. based on glycyrrhizin content.

Abstract

Glycyrrhizin (GC) is a triterpenoid saponin isolated from the roots of Glycyrrhiza spp., a medicinal plant that is present in 70% of Kampo prescriptions. Since the GC content in Glycyrrhiza spp. affects its various pharmacological activities, Glycyrrhiza spp. is prescribed to contain at least 2% of GC in the Japanese pharmacopoeia, and its quality control based on GC content is required. In this study, a magnetic particles-based enzyme immunoassay (MPs-EIA) was developed using specific monoclonal antibody against GC (MAb 2H2) for the detection of GC in Glycyrrhiza spp. In this system, the immunoreaction time using primary and secondary antibodies was reduced by taking advantage of the wide surface area of magnetic particles (MPs) conjugated with GC by N,N'-carbonyldiimidazole (CDI)-mediated method. Optimization of MPs-EIA revealed that total assay time (~2 h) was reduced to over half of that of conventional indirect competitive enzyme-linked immunosorbent assay (ELISA) (~5 h). In addition, the GC concentration was detectable within the range from 97.7 to 781 ng/mL, with a limit of detection of 71.4 ng/mL. A series of further validation analyses support the reliability and accuracy of the developed MPs-EIA for the detection of GC in Glycyrrhiza spp. Since the present MPs-EIA overcomes the disadvantage of ELISA in terms of rapidity, it provides a useful approach for the effective quality control of Glycyrrhiza spp., especially when handling multiple samples.