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Development of a surface display ELISA to detect anti-IgG antibodies against bovine αS1-casein in human sera.

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Abstract

The aim of the present study was to develop a surface display ELISA (SD-ELISA) for IgG-serum reaction against bovine casein αS1 (CSN1S1). In a SD-ELISA, the antigen is displayed on the surface of Escherichia coli using the autodisplay technology and whole cells of E. coli are used to coat the microplates for serum testing. After establishing the setup of the SD-ELISA with polyclonal rabbit antiserum against bovine CSN1S1, the SD-ELISA was validated with 20 human sera, of which 10 sera were proven to have an IgG-mediated reaction against bovine CSN1S1 and 10 sera were shown to be negative for this reaction. Receiver operating characteristics (ROC) analysis revealed sensitivity of 100% and a specificity of 100% at a cut-off value of 0.133. Furthermore, human serum of 48 patients with known reactivity against human CSN1S1 (31 positive and 17 negative) was examined by the newly developed SD-ELISA to exclude cross-reactivity. Twenty human sera showed an IgG-mediated reaction against bovine CSN1S1. Eleven of these sera were positive for the reactivity against human CSN1S1, and nine were negative. In conclusion it was demonstrated that the performance of SD-ELISA is comparable to established ELISA without loss in sensitivity or specificity. Based on the advantages of this method - in particular no need for time-consuming and expensive antigen production and purification - the SD-ELISA is a potent alternative to convenient methods for identification and especially high-throughput screening of new antigens in the field of food allergies.