Development of Amperometric Immunosensors Using Positively Charged Ferrocene Polymer

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Transferrin is a carrier glycoprotein which plays a central role in iron metabolism of vertebrate animals, transporting iron between its absorption, storage, and utilization sites. Therefore, determination of the transferrin level in blood will brought useful information for the evaluation of both iron and protein nutrition. An amperometric immunosensors for the quantification of transferrin was fabricated using two monoclonal IgG class anti-rat transferrin antibodies, 15C2H3 and 22A06D2. The former was immobilized on a gold electrode (gold=antibody) while the latter was conjugated with the positively charged polymers containing ferrocenyl groups (antibody=ferrocene). Bovine serum albumin coating on the antibody immobilized electrode was performed to eliminate nonspecific binding. The quantitative analysis of transferrin was investigated by measuring the electrooxidation current of ferrocene, which is proportional to the transferrin concentration for the equivalently observed sandwich formation (gold=antibody-antigen-antibody=ferrocene). The deposition of electroconductive polymer, poly[ferrocenylmethyl-3-(pyrrol-1- yl)propyldimethylammonium bromide] (poly-FP), on the surface of gold= antibody before the sandwich formation not only increased the sensor response, but also eliminated the nonspecific binding of antibody=ferrocene by a mutual repulsion. The sensitivity of the prepared sensor was 15 times higher than that of monomers conjugated sensors.