

Anxiety determination by antibody-conjugated nanoparticles on an interdigitated electrode sensor

Abstract

This work focused on the detection of cortisol on an interdigitated electrode sensor surface using an anti-cortisol antibody. To improve immobilization, antibodies were conjugated with silver nanoparticles and attached to the surface of the sensor. Cortisol interacted in a dose-dependent manner on the antibody-immobilized sensor surface, and current changes were observed. Linear regression analysis was performed by a 3σ calculation, and the limit of detection fell into the range of 0.01 and 0.1 ng/mL. The sensitivity of cortisol was calculated to be 0.01 ng/mL and the sensor discriminated against other hormones, namely norepinephrine and progesterone, with higher selectivity for cortisol. This result represented the selective detection of cortisol with high performance, which can help to determine anxiety disorders.

Keywords

Anxiety; Cortisol; Electrochemical sensor; Nanomaterial; Silver nanoparticle