

A Novel Flow-Based Amine-Conjugated Gold Nanoparticles as a Sensor for Salivary Cortisol Detection

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A rapid and simple method for detecting cortisol, a stress hormone, in saliva was developed for the early diagnosis of stress-related diseases. The detection was based on the reaction between cortisol and gold nanoparticles (AuNPs) modified with either cysteine (AuNPs-cysteine) or cysteamine (AuNPs-cysteamine), resulting in the aggregation of the conjugated AuNPs. In this study, cortisol detection was achieved by measuring the flow distance and color intensity of the reacted conjugated AuNPs on a nitrocellulose membrane. Herein, 20-nm AuNPs were conjugated with cysteine or cysteamine. The limit of detection (LOD) and sensitivity of cortisol detection in a phosphate-buffered saline (PBS) system were 1.98 nM and 0.0040, respectively, for AuNPs-cysteine, while for AuNPs-cysteamine, the LOD and sensitivity were 8.75 nM and 0.0029, respectively. Cortisol detection was also performed in artificial saliva. However, both conjugated AuNPs were found to be susceptible to interference from potassium dihydrogen phosphate, albumin, estrogen, and progesterone. Overall, the developed cortisol test kit shows promise as a tool for early stress detection and monitoring, potentially reducing the risk of stress-related health problems.

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