

A Gold Nanoparticle-based Novel Method for Screening Anti-Aggregation Drugs of Protein Conformational Diseases

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The cellular deposition of unstable protein occurs in many protein conformational diseases, such as neurodegeneration and alcoholic liver diseases. However, the conventional methods to screen anti-aggregation drugs for the protein conformational disease are limited because of labor-intensive, complicated pretreatment steps, and expensive instrumentation. Here, we present a nanoparticle-assisted rapid colorimetric drug screening method for finding anti-aggregation drugs. In our method, nanoparticles act as catalytic activators, which accelerate the kinetics of the protein aggregation. Simultaneously, these nanoparticles exhibit colorimetric responses according to their embedded shapes on the aggregates. By using this method, we achieved rapid screening of anti-aggregation drugs, which can attenuate protein aggregation depending on their binding affinity to target protein. As a result, we observed colorimetric responses for anti-aggregation effect with the naked eye within a few minutes. Moreover, we evaluated the drug effect through corresponding spectral shifts. These findings will accelerate not only developing nanoparticles-assisted drug screening but also therapeutic methods.