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Aptamer-based visual colorimetric detection of methamphetamine using unmodified gold nanoparticles

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In recent years, besides the classic drugs, addiction to a series of new drug classes known as club drugs has been widely increased. Fast and low-cost bioassay for detection of these amphetamine based drugs can be an effective strategy for decreasing its abuse. In that regard, a novel bioassay strategy based on unmodified gold nanoparticles (AuNPs) and a DNA aptamer has been developed to detect methamphetamine. In this design, in the absence of the target molecule, the Apt+AuNPs solution resists against salt-induced aggregation and the color of the solution remains red. Binding of the target molecule to the aptamer leads to the aptamer conformational changes. As a result, the aptamer could not stabilize AuNPs against salt-induced aggregation and the color changes from red to purple.

This approach can be served as a very simple and promising colorimetric probe for selective detection of methamphetamine down to the nanomolar range within minutes.

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