Construction of an aptasensor for detection of kanamycin

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Abstract

Introduction: Aptamers are single stranded DNA or RNA sequences, obtained by an in vitro process called SELEX (systematic evolution of ligands by exponential enrichment). They react to their targets with high specificity and affinity. Aptamers have high potential applications in medicine because of their unique properties such as low cost, ease of production and modification, excellent thermal stability, and lack of immunogenicity and toxicity.

Methods: The aim of this study was to design a fluorescent aptamer-based sensor (aptasensor) for sensitive detection of kanamycin based on silica nanoparticles (SNPs).In the absence of kanamycin, the SNPs-double stranded DNA (Aptamer-Complimentary strand conjugate) complex is intact and has the maximum fluorescent signal. Upon addition of kanamycin, the aptamer binds to its target and causes the dissociation of labeled-complementary strand from dsDNA and SNPs, leading to decrease of the fluorescence intensity.

Results: This aptasensor exhibited a high sensitivity toward kanamycin with a limit of detection (LOD) as low as 612 pM. The designed aptasensor was successfully used to detect kanamycin in serum and a limit of detection as low as 453 pM was obtained.

Conclusion: By changing of the specific aptamers, such construction can be a general platform for detection of other biomolecules in trace amounts.

Key words: Aptamer, Biosensor, Kanamycin