Illegal Substance Biodetectives: Apta-Liposomes

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Using of addictive substances is one of humankind's oldest problems. They are considered an important disease of the brain. Substance abuse is not only the problem of health sciences, but also affects sociological, philosophical, security and legal aspects of life and it is a serious public health issue that impact on youth. Under the light of this problem, fast and cost-effective detection of abused drugs in biological fluids (urine and saliva) is extremely significant in respect to monitoring of both treatment process and forensic problems. According to these requirements, in this project we aimed to develop a testing system designed with a new methodological approach. In the project, nanoparticle and aptamer based new sensing platform was designed for cocaine (as a model abused drug) detection. The developed µ-well assay which is termed as “Illegal Substance Biodetector”, takes critical advantages in terms of selectivity and stability thanks to aptamer use as recognition molecule and liposomes as signal enhancer. Briefly, the surface design of µ-wells was performed and characterized. Afterwards, critical analytical performance parameters of sensing platform were investigated. Finally, the designed Illegal Substance Biodetector was successfully applied to the synthetic biological fluids (synthetic urine and saliva) and confirmed by chromatography technique. As a result, we can say that our sensing platform is a good candidate as a drug abuse kit which can be used in forensic and toxicological laboratories because of numerous advantages such as miniaturization, portability, practical use, low cost, high selectivity and usage for both qualitative and quantitative results.

Awards Won:
Fourth Award of $500
National Institute on Drug Abuse, National Institutes of Health &amp the Friends of NIDA: Honorable Mention