A Handheld Light Meter Device for Methamphetamine Detection in Oral Fluid

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Abstract : Oral fluid is a promising diagnostic matrix for drugs of abuse compared to urine and serum. Detection of methamphetamine in oral fluid would pave way for the easy evaluation of impairment in drivers during roadside drug testing as well as ensure safe working environments by facilitating evaluation of impairment in employees at workplaces. A membrane-based point-of-care (POC) friendly pre-treatment technique has been developed which aided elimination of interferences caused by salivary proteins and facilitated the demonstration of methamphetamine detection in saliva using a gold nanoparticle based colorimetric aptasensor platform. It was found that the colorimetric response in saliva was always suppressed owing to the matrix effects. By navigating the challenging interfering issues in saliva, we were successfully able to detect methamphetamine at nanomolar levels in saliva offering immense promise for the translation of these platforms for on-site diagnostic systems. This subsequently motivated the development of a handheld portable light meter device that can reliably transduce the aptasensors colorimetric response into absorbance, facilitating quantitative detection of analyte concentrations on-site. This is crucial due to the prevalent unreliability and sensitivity problems of the conventional drug testing kits. The fabricated light meter device response was validated against a standard UV-Vis spectrometer to confirm reliability. The portable and cost-effective handheld detector device features sensitivity comparable to the well-established UV-Vis benchtop instrument and the easy-to-use device could potentially serve as a prototype for a commercial device in the future.

Keywords : aptasensors, colorimetric gold nanoparticle assay, point-of-care, oral fluid
Conference Title : ICBB 2024 : International Conference on Biosensors and Bioelectronics
Conference Location : Melbourne, Australia
Conference Dates : November 07-08, 2024