

Aptamer nanobiosensors

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Aptamer-based nanobiosensors have recently gained popularity, and are being moulded for clinical diagnostics and detection purposes. Aptamers are short single-stranded DNA or RNA molecules that possess a high affinity towards certain molecules and bind to them. They were designed to sense the target molecule and can be used as biosensors due to their high specificity, high sensitivity, small size and high affinity. Aptamer-based nanobiosensors have flexible conformation between 2D and 3D, which have widened their range of applications. They have been designed to detect diseases that are as severe as cancer and human immunodeficiency virus (HIV). Partnering with nanoparticles, aptamer biosensors can be considered as an advanced and fast tool for the early detection of diseases which has made it possible for immediate treatment. Aptamer biosensors, conjugated with nanoparticles, such as gold and silver metals, can contribute towards the testing and detection of drugs and other pharmaceutical substances in animals and the human body. They are being programmed for electrochemical, optical, colorimetric, acoustic, and transistor-based detection. Additionally, they are being explored further by intertwining them with mechanical devices for large-scale detection systems. They can also be used in industries that have installed power plants or bioreactors. Due to their higher sensitivity, they can accurately detect the quantity of a substance in industrial processes and act as an alert system. Not only that, aptamer nanobiosensors are being used to build microfluidic chips for environment monitoring. This detection technology could soon replace the heavy monitoring and detection devices and will help in making more accurate decisions and interpretations in the health care and engineering sectors.

Keywords: Aptamer, Nanobiosensors, High selectivity, Microfluidic chips, Environment monitoring

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