Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

CHAPTER

Biosensors-based approaches for other viral infection detection 21

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21.1 Introduction

Contamination and infection due to viruses are one of the major reasons for diseases amounting to hundreds of thousands of deaths every year (Alvarez et al., 2017). In recent years, several novels and reemerging viral diseases have seen an outstanding rise in occurrence like coronavirus disease 2019 (COVID-19) which has arguably altered the socio-economic strata and also pointed out the shortcomings in medical biology and diagnostics at a global scale (Blumenthal et al., 2020). The overwhelming burden of global infection numbers exceeded expectations from federal healthcare programs and medical facilities (Hamid et al., 2020). The current situation pointed out that the cost of reliable tests is disproportionately high in case of frequent repetition of tests on one person. Also, the speed of distribution, implementation, and evaluation of tests are unsatisfactory in the current situation, both technically and logistically. Viruses are nonliving obligate parasites and require living host cells to replicate and propagate (Tong & Revill 2016). Due to their error-prone replication mechanism and fast mutations, the protective layers and mechanisms change quickly, thus helping them to evade immune reactions in the host cell (Smith, 2017). This has led to reemergence and also establishing new virus strains. Medicinal biology and conventional diagnostic practices are now facing a challenging task to upkeep with the pace of these occurrences. Therefore to improve the quality of detection and to help in the reduction of cost, major advancements are required in the detection techniques to better prepare the healthcare system for a similar novel virus infection in the future.

One of the crucial elements in the point-of-care diagnosis and recovery from pathogenic diseases is early detection. Conventional diagnostic approaches for virus detection include virus isolation and screening from clinical samples, polymerase chain reaction (PCR)-based assays (Mackay et al., 2002) and enzyme-linked immunosorbent assays (ELISA) (Torane & Shastri 2008), and immunofluorescence assays (Kiptoo et al., 2004), etc. On the other hand, several techniques are useful for the quantification of viruses measuring viral infectivity (such as plaque assay, $TCID_{50}$), quantifying viral genetic material or protein (qPCR, western blotting) (Gueudin et al., 2012; He et al., 2004) or directly counting viral load using flow cytometry (Zamora & Aguilar 2018). Despite the good accuracy, these methods are time-consuming, labor-intensive, and arguably less-

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