

Silicon nanowire sensor for immunological treatment - another approach for fighting pandemic

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Abstract

As of April 28, 2020, a pandemic called coronavirus disease 2019 (COVID-19) has spread to every continent of the world, infecting around three million people, and taken nearly 200,000 lives [1]. Although such deadly events are not new throughout human history, they often cause fear and uncertainty, mostly because of lacking information about the new strain of the virus. Insight about the virus and its working mechanism is perhaps important yet understanding the human immune response is the key to reducing mortality. Our immune system reacts differently depends on ages, genders, races, and health background. That explains dissimilar COVID-19 progression in patients where some develop critical conditions while others only have mild symptoms [2]. Accumulating evidences suggest patient with severe COVID-19 symptoms is due to cytokine - a common name for a broad spectrum of small proteins important in cell signalling, especially in the immune system - dysregulation [3-5]. Therefore, many studies have suggested a screening of cytokine profiles together with other immune cells responses for the determination of correct treatment [3,5]. Meanwhile, nanosensors such as silicon nanowire (SiNW) own advantages of being sensitive to small molecules, rapid and label-free [6]. In this poster, we demonstrate the use of a SiNW sensor in immunotherapy research, more specifically, in a system of switchable T-cell expressing chimeric antigen receptors (CARs). The sensor showed better sensitivity and a much lower limit of detection compare to standard ELISA tests. Moreover, thanks to its compatibility with CMOS technology which enables mass production, reproducibility is ensured [7]. Since the cytokine release syndrome (CRS) found in COVID-19 patients is also observed in patients receiving CAR-T therapy [4], the knowledge and tools generated by the SiNW sensor developed in this field of study may benefit the community. In the end, a full understanding and control of our immune system might be the key to fight any other pandemic in the future.

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