Immune response

The immune response is how your body recognizes and defends itself against bacteria, viruses, and substances that appear foreign and harmful.

The immunosuppressive microenvironment in glioblastoma (Glioblastoma) prevents an efficient antitumoral immune response and enables tumor formation and growth.

The ability to rapidly assess and monitor patient immune responses is critical for clinical diagnostics; vaccine design; and fundamental investigations into the presence or generation of protective immunity against infectious diseases. Recently; findings on the limits of antibody-based protection provided by B-cells have highlighted the importance of engaging pathogen-specific T-cells for long-lasting and broad protection against viruses and their emergent variants such as in SARS-CoV-2. However; low-cost and point-of-care tools for detecting engagement of T-cell immunity in patients are conspicuously lacking in ongoing efforts to assess and control population-wide disease risk. Currently available tools for human T-cell analysis are time and resource-intensive. Utilizing multichannel silicon nanowire field effect transistors (Si-NW-FET) compatible with complementary metal-oxide-semiconductor (CMOS); Nami et al. developed a device designed for rapid and label-free detection of human T-cell immune responses. We demonstrate the generalizability of this approach by measuring T-cell responses against melanoma antigen MART1; common and seasonal viruses CMV; EBV; flu; as well as emergent pandemic coronavirus; SARS-CoV-2. Further; this device provides a modular and translational platform for optimizing vaccine formulations and combinations; offering quick and quantitative readouts for acquisition and persistence of T-cell immunity against variant-driven pathogens such as Flu and pandemic SARS-CoV-2 [1)].

1)
Nami M, Han P, Hanlon D, Tatsuno K, Wei B, Sobolev O, Pitruzzello M, Vassall A, Yosinski S, Edelson R, Reed M. Rapid Screen for Anti-viral T-cell Immunity with Nanowire Electrochemical Biosensors. Adv Mater. 2022 Feb 14:e2109661. doi: 10.1002/adma.202109661. Epub ahead of print. PMID: 35165959.