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. 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); we 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)]

In a issue of Neuron, Stoeber et al. (2018) report a biosensor resolving the spatiotemporal organization of opioid receptor activation in living neurons. They delineate novel signaling mechanisms in endosomes and Golgi differentially engaged by opioid peptides and drugs [2)].

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.
2)
Wang D, Berg DJ, Scherrer G. Beware of Undertow: Opioid Drugs Generate Additional Waves of Intracellular Signaling. Neuron. 2018 Jun 6;98(5):870-872. doi: 10.1016/j.neuron.2018.05.035. PubMed PMID: 29879387.

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