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DETECTION AND IDENTIFICATION OF CELL BOUND AND SOLUBLE ANTIGENS USING MAGNETIC LEVITATION: POC DETECTION

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Magnetic levitation is a technique for measuring the density and the magnetic properties of objects suspended in a paramagnetic field. Cells can be monitored and studied in an uninterrupted state. Here, we describe a novel magnetic levitation-based method that can specifically detect cell membrane-bound and soluble antigens by measurable changes in levitation height that result from the formation of antibody-coated bead and antigen complex. We demonstrate our method's ability to sensitively detect an array of membrane-bound and soluble antigens found in blood, including T-cell antigen CD3, eosinophil antigen Siglec-8, red blood cell antigens CD35 and RhD, red blood cell-bound Epstein-Barr viral particles and soluble IL-6, and validate the results by flow cytometry and immunofluorescence microscopy performed in parallel. Furthermore, extracellular vesicles (EVs) can be detected with the addition of anti-CR1 and anti-CD47 in an ELISA based complex. This may provide a quick yes or no EV/antigen answer. Finally, employing an inexpensive, single lens, manual focus, wifi-enabled camera (Melissa), we extend the portability of our method for its potential use as a point-of-care diagnostic assay with limitless applications. Future studies are incorporating the use of CCL11 for the prognosis of chronic traumatic encephalopathy. This could lend itself to immediate diagnosis of conclusions, Alzheimer's disease and dementia.

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