Adaptive Focused Acoustics (AFA) Improves the Performance of Microtiter Plate ELISAs

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Abstract

We investigated the use of Adaptive Focused Acoustics (AFA) technology to improve the performance of microtiter plate enzyme-linked immunosorbent assays (ELISAs). Experiments were performed with commercially available AFA instrumentation and off-the-shelf 96-well microtiter plate sandwich ELISAs. AFA was applied over a range of acoustic energies, temperatures, and durations to the antigen/antibody binding step of an ELISA for measuring HIV-1 p24 in tissue culture samples. AFA-mediated antigen/antibody binding was enhanced up to 2-fold over passive binding at comparable temperatures and was superior or comparable at low temperature (8–10 °C) to passive binding at 37 °C. Lower nonspecific binding (NSB), lower inter- and intra-assay coefficients of variation (CVs), higher Z′ factors, and lower limits of detection (LODs) were measured in AFA-mediated assays compared with conventional passive binding. In a more limited study, AFA enhancement of antigen/antibody binding and lower NSB was measured in an ELISA for measuring IGFBP-3 in human plasma. We conclude from this study that application of AFA to antigen/antibody binding steps in microtiter plate ELISAs can enhance key assay performance parameters, particularly Z′ factors and LODs. These features render AFA-mediated binding assays potentially more useful in applications such as high-throughput screening and in vitro diagnostics than assays processed with conventional passive antigen/antibody binding steps.

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