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.

http://jbx.sagepub.com/content/early/2014/02/18/1087057114523650