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Quantitative Analysis of Four Protein Biomarkers: an Automated Microfluidic Cartridge-based Method and its Comparison to Colorimetric ELISA

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Abstract

Biomarker quantitation with ligand binding assays has matured greatly in recent years. This maturation has been partly in response to demands for more data points from fewer samples or less available sample volume. Multiplexing offers opportunities to acquire data for multiple analytes from single sample assay iterations, but has its own unique challenges and limitations. ProteinSimple has developed Simple Plex™, an automated immunoassay platform consisting of microfluidic cartridge-based assays run on the Ella instrument. Ella subverts traditional multiplexing challenges by rapidly performing triplicate measurements of up to four different analytes simultaneously, each in their own respective assay vessels and all from a single sample. Here we describe a comparison of the Simple Plex platform versus colorimetric ELISA and their respective abilities to quantitate four common biomarkers (MCP-1/CCL2, VEGF-A, TNF-α, and IL-6) from twenty-eight healthy individual donor plasma samples. Each biomarker was tested on the two platforms on each of two days. Ella analysis required significantly reduced sample volume, manual steps, and total time. Overall, Ella was able to quantify results for all twenty-eight samples for each of the four biomarkers. In contrast, ELISA was able to measure quantifiable results within respective calibration curve ranges for MCP-1/CCL2 (96% of samples) and VEGFA (7% of samples). For TNF-α and IL-6, ELISA was not sensitive enough to quantify any samples in the assay ranges. This stark difference in quantitative results underscores Ella's ability to multiplex without compromising sensitivity, and has far reaching potential for biomarker panel measurement in support of diagnosis, prognosis, and monitoring of disease.

Highlights

- Automated microfluidic cartridge-based ELISA
- Multi-analyte, but not multi-plexed, analysis enables single analyte specificity and sensitivity
- In range biomarker measures correlate well with traditional ELISA measurements of same samples
- Benefits over ELISA include less hands-on and total assay time, lower volume requirements, increased sensitivity, & broader range

KEYWORDS: biomarker, multiplexing, automation, throughput

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