Multiplexed analysis of apolipoprotein A1, apolipoprotein B and apolipoprotein E in normo- and hyper-triglyceridemic specimens using an automated SISCAPA-MRM workflow

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Measuring the cholesterol content of low and high density lipoproteins (LDL-C and HDL-C) has been the gold standard method for risk estimation in cardiovascular disease (CVD). However, multiple reports indicate that measuring the ratio of apolipoprotein B₅₀₀ to apolipoprotein A₁ provides a more accurate risk assessment, especially in patients suffering from hyperlipidemia [1]. In addition, apolipoprotein E has been shown to mediate clearance of triglyceride rich lipoprotein remnants [2] and is, thus, considered to be an emerging biomarker for CVD.

Here we present a multiplexed, automated SISCAPA assay for precise measurement of apoA₁, apoB₅₀₀ and apoE, both in liquid serum/plasma specimens and in dried blood spots. Using the SISCAPA method, we measured these apolipoproteins in 54 hypertriglyceridemic (HTG) and 46 normotriglyceridemic (NTG) samples (duplicate measurements over two days). The average total workflow CV across 100 samples for apoA₁, apoB₅₀₀ and apoE were determined to be 3.4%, 4.9% and 4.2% respectively. The samples had assigned apoA₁ and apoB₅₀₀ values as measured by immunoturbidimetric (ITA) assay. We observed a strong correlation (R² = 0.996) between SISCAPA measurement of apoB₅₀₀/apoA₁ and the ITA measurement in the same samples. We did not observe a significant change in apoA₁ concentrations between the HTG and NTG samples. However, the data indicate significant increases in apoB₅₀₀ and apoE concentrations in the HTG specimens (p-value of 6.74 e -9 and 8.68 e -20, respectively).

To further study the behavior of these apolipoproteins based on dietary fat intake, we are currently undertaking a longitudinal experiment using dried blood spots (DBS). We aim to explore the value of longitudinal sample collection for both short-term and long-term monitoring and therapeutic management of lipid/lipoprotein profile on an individual basis.
References
