Summary

A centrifugal microfluidic LabDisk for total cholesterol [TC] determination from whole blood and a processing device have been developed. Centrifugal microfluidic sample-to-answer processing features direct sampling from the fingertip, aliquoting (for analysis of an additional parameter), blood plasma separation, rehydration of prestored reagents, and real-time absorbance measurement of enzymatic reactions. Time to result for fluidic processing and readout is 7 min with room for optimization to less than 4 minutes. It was demonstrated that the TC assay can be integrated into LabDisk based multiparameter analysis of whole blood.

Sample-to-answer LabDisk

A whole blood sample is taken from the fingertip applying a LabDisk integrated 40 µL end-to-end capillary shown in figure 1. The centrifugal device shown in figure 2 is used to control microfluidic processing of the sample. Lab Disk integrated cuvettes are used for absorptiometric detection of TC concentration (figure 4).

Results

Figure 4: Variance comparison of the TC concentrations of the LabDisk to the TC concentrations determined with the LDX reference system using the same samples, whereas LDX results are shown on the X-axis, LabDisk results on the Y-axis. The dashed line shows the target curve for each concentration. Samples #1 & #2 show comparable results to the reference system, sample #3 varies around the reference result with a CV of 6.3 %.

Conclusions

Results are in line with common testing systems. Only 40 µL of sample is required. Time to result is 7 minutes (with room for optimization). The centrifugal microfluidic is designed to integrate multiparameter analysis like the detection of HDL-cholesterol and TG without affecting the time to result.

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