Evaluation of an Advanced Cystatin C Assay on DiaSys Automated Analyzer respons®920

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OBJECTIVE

Cystatin C is an endogenously expressed, non-glycosylated protein that represents an excellent biomarker for moderate impairment of kidney function. Increased Cystatin C levels indicate an even slightly reduced glomerular filtration rate (GFR) compared to conventional parameters like Creatinine. Since kidney diseases develop slowly and in the beginning painless, the majority of individuals with early stages of chronic kidney disease remain undiagnosed. Therefore, early detection of renal insufficiency by a sensitive marker as Cystatin C is of increasing importance to avoid the irreversible condition of renal failure.
The aim of this study was to establish an advanced particle-enhanced Cystatin C assay for DiaSys respons®920, a bench top random access clinical chemistry analyzer. The requirements for this test were superior performance and traceability to IFCC reference material for reliable detection of impaired GFR.

METHODOLOGY

Assay adaption as well as performance verification have been carried out on DiaSys respons®920. All reagents, calibrators and controls were provided by DiaSys Diagnostic Systems GmbH. Calibration stability was optimized by the use of an aqueous 5-level calibrator set containing recombinant Cystatin C, reflecting various conformations of native Cystatin C in different sample material. Method comparisons were performed against nephelometric and immunoturbidimetric competitor assays. Data have been evaluated by using regression analysis according to Passing and Bablok. Inter- and intra-assay imprecision were performed according to the CLSI protocol (EP5-A2). Traceability was investigated by using IFCC reference material ERM-DA417/IFCC.

RESULTS

Comparative studies of Cystatin C FS on respons®920 were carried out with 104 native serum and heparin plasma samples against Hitachi (Fig.1) as a common laboratory analyzer [r=0.999; Passing/Bablok: y=0.977 x + 0.006 mg/L] confirming equivalent performance. Good correlation of Cystatin C FS against latest immunoturbidimetric [r=0.9975; Passing/Bablok: y=0.984 X + 0.032 mg/L] as well as a current nephelometric competitor assays [r=0.9970; Passing/Bablok: y=0.974 X + 0.017 mg/L] was demonstrated (Fig.2,3). Moreover, DiaSys Cystatin C FS is highly precise with an intra-assay precision of a CV ≤ 2.53% and an inter-assay precision of CV ≤ 3.71% on respons®920 (table 1,2). Based on an advanced calibration approach high calibration stabilities of up to 6 weeks were achieved (Fig. 5). Due to good correlation of DiaSys calibrator to IFCC reference material traceability was demonstrated [r=0.999; Passing/Bablok: y=1.0 X + 0.02 mg/L] (Fig.4).

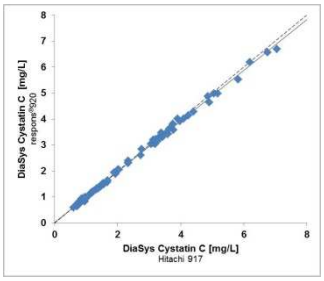

Fig. 1: System comparison vs Hitachi 917

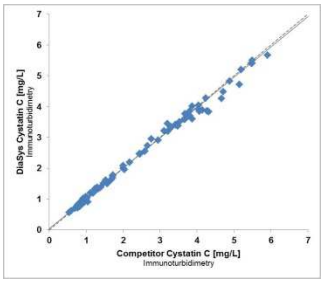

Fig. 2: Comparison vs Immunoturbidimetry

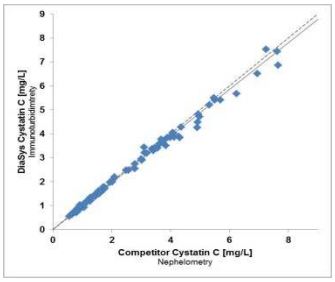

Fig. 3: Comparison vs Nephelometry

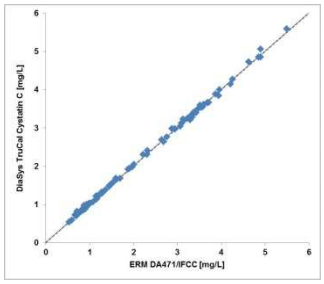

Fig. 4: Traceability to ERM-DA471/IFCC reference material

Mean [mg/L]	SD [%]	CV [%]
0.70	0.02	2.53
0.95	0.02	2.26
3.08	0.06	1.88

Table 1: Intra-assay precision (n=20)

Mean [mg/L]	SD [%]	CV [%]
0.91	0.03	3.71
1.12	0.03	3.08
3.44	0.12	3.53

Table 2: Inter-assay precision (n=20)

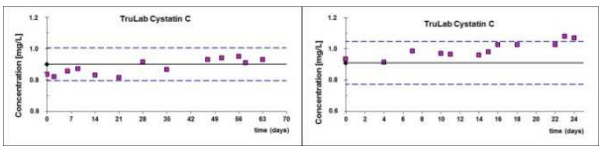

Fig. 5: Calibration stability of Hitachi 911 and respons®920

CONCLUSIONS

Here we present a Cystatin C assay with outstanding performance especially for specificity and precision. This test performs very well on DiaSys respons®920 systems and reveals equivalent performance on common analyzers as Hitachi. The advantages of combining Cystatin C FS with respons®920 as a flexible and convenient system are reliable results, optimized workflow and high efficiency, achieved by the perfect match of analyzer, system reagents and applications.
Moreover, Cystatin C FS highly correlates to nephelometric and immunoturbidimetric tests and is traceable to ERM-DA471/IFCC reference material. In summary, DiaSys Cystatin C assay represents an excellent tool for early and reliable detection of even slightly impaired kidney function.

REFERENCES 1. Hoek FJ et al. (2003). A comparison between cystatin C, plasma creatinine and the Cockcroft and Gault formula for the estimation of glomerular filtration rate. Nephrol Dial Transplant; 18:2024-31. 2. Erland JE et al. (1998). Reference intervals for serum cystatin C and serum creatinine in adults. Clin Chem Lab Med; 36(6):393–397. 3. Kyhse-Andersen et al. (1994) Serum cystatin C, determined by a rapid, automated particle-enhanced turbidimetric method, is a better marker than serum creatinine for glomerular filtration rate. ClinChem; 40(10):1921-6.