Therapeutic Drug Monitoring of Adalimumab: a comparative study of a new point-of-care quantitative test with three established ELISA assays

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Aims

The need for therapeutic drug monitoring (TDM) in the treatment of inflammatory bowel disease (IBD) patients under biologics, namely adalimumab (ADA), is unquestionable. Several ELISA-based methodologies are already available in the market. A new point-of-care device (POC-ADA) was recently launched for monitoring serum ADA levels. The aim of this study was to validate the first point of care for TDM of serum ADA levels available in the market by comparing it with three well-established methods.

Methods

Sera from IBD patients undergoing ADA therapy were quantified by four assays: point-of-care lateral flow Quantum Blue® from Buhlmann (POC_ADA) and ELISA formats from Immundiagnostik (ELISA A), R-Biopharm (ELISA B) and an in-house assay. Moreover, donor's serum samples were spiked with known concentrations of ADA and the percentage of recovery of each assay was evaluated.

Results

Spiked samples showed an excellent Intraclass Correlation Coefficient (ICC) between theoretical and measured concentrations for all the assays 0.927, 0.984, 0.982 and 0.989 and a good recovery 111%, 113%, 86%, 110%, respectively ELISA A, ELISA B, POC_ADA and in-house ELISA.

Table 1. ICC between the theoretical and measured concentrations of exogenously-spiked samples

	ICC		Difference	
	ICC	CI 95%	Average	CI 95%
POC_ADA	0.982	0.933–0.995	2.71	0.95;4.48
In-house	0.989	0.958-0.997	-1,31	-2.84;0.22
ELISA B	0.984	0.940–0.996	-0.60	-2.31;1.13
ELISA A	0.927	0.727–0.980	-4.67	-9.74;0.39

Regarding the clinical samples, the ICC of the POC-ADA assay vs. the three ELISA-based established methods was 0.590, 0.761 and 0.864, respectively POC_ADA/ELISA A, POC_ADA/in-house ELISA and POC-ADA/Elisa B (Table 2)

When using different cutoffs for a qualitative comparison, POC_ADA showed an accuracy between 73-89% and the kappa statistics revealed mostly a good agreement (0.492 and 0.682).

Table 2.. ICC and differences found upon comparing the different ADL quantification assays in clinical samples

	ICC		Difference	
	ICC	CI 95%	Average	CI 95%
POC_ADA				
In-house	0.761	0.658–0.834	0.59	–0.48;1.66
ELISA B				
POC_ADA	0.864	0.805–0.905	3.13	2.20;4.06
In-house	0.693	0.559–0.786	3.72	2.38;5.07
ELISA A				
POC_ADA	0.590	0.411–0.714	13.34	10.86;15.81
ELISA B	0.530	0.326–0.673	10.20	7.50;12.90
In-house	0.610	0.440–0.728	13.93	11.47;13.94

Conclusions

The new and first POC-ADA rapid test, which is able to deliver results within 15 min, can be safely used to replace the commonly used ELISA-based ADA quantification kits. This new assay is perfect for immediate concentration adjusted dosing avoiding delays cause by ELISA assays with a turnaround time of approximately 8h.