High Correlation of the Quantum Blue® rapid assay with HPLC tandem mass spectrometry for infliximab therapeutic drug monitoring

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BACKGROUND

A successful and cost-effective infliximab therapy for patients suffering from chronic inflammation such as inflammatory bowel disease (IBD) is jeopardized if the drug is not adjusted within an ideal therapeutic window[1]. Several methods allow for quantitative determination of infliximab serum levels to achieve therapeutic drug monitoring (TDM) and guide clinical decision-making. TDM rapid testing enables immediate result reporting and therapy adjustments without delay. Still, comparability of different infliximab assays is a common issue which needs to be investigated. Here, we report high comparability of the Quantum Blue® Infliximab rapid test to the highly precise HPLC tandem mass spectrometry (LC-MS/MS) method established at Mayo Clinic (USA)[2].

METHODS

Hundred and twenty-seven de-identified blood serum samples from patients receiving infliximab were measured using LC-MS/MS (SCIEX API 5000) at Mayo Clinic[2] and the Quantum Blue® Infliximab lateral flow based rapid test. The obtained infliximab concentrations from both methods were compared by Passing-Bablok linear regression and Bland-Altman analysis. Furthermore, precision assessment of the Quantum Blue® Infliximab assay was conducted using the LC-MS/MS spiked human serum quality control samples at infliximab target concentrations of 2.5, 8 and 21 µg/mL, n=25 replicates.

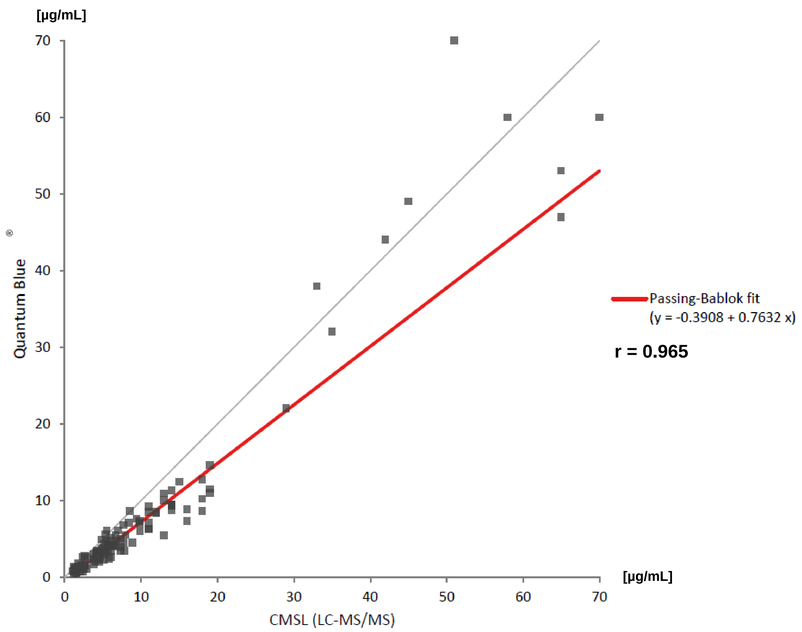

Fig. 1. Passing-Bablok regression analysis

	Level I	Level II	Level III
Target value [µg/mL]	2.5	8	21
Mean [µg/mL]	2.09	7.56	22.70
SD	0.30	1.46	4.33
%CV	14.2%	19.3%	19.1%

Fig. 2. Precision assessment for the Quantum Blue ® Infliximab assay.

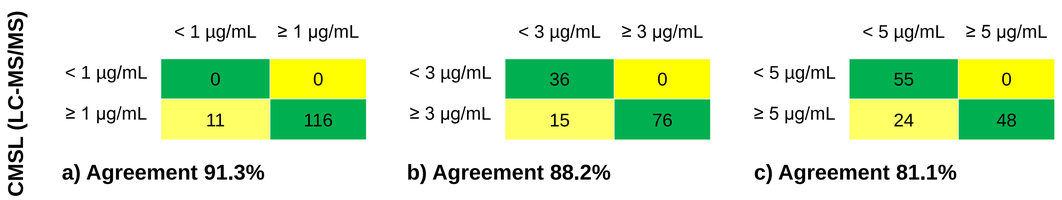

Fig. 3. Overall analytical agreement to commonly used, pathology dependent decision points of a) 1 µg/mL, b) 3 µg/mL and c) 5 µg/mL.

RESULTS

The sample values obtained with the Quantum Blue® Infliximab rapid test showed comparability to the values gained with the LC-MS/MS method. Passing-Bablok regression analysis revealed a correlation coefficient of r = 0.965 and a slope of 0.7632 when infliximab concentrations ranged from 1 to 70 mcg/mL (**Fig. 1**). Bland-Altman analysis revealed a mean difference in the obtained values of -2.12 µg/mL when comparing the rapid test to the LC-MS/MS reference method. The precision assessment for the Quantum Blue® Infliximab assay showed 14.2% CV for target level 2.5 µg/mL, 19.3% CV and 19.1 %CV for target levels 8 and 21 µg/mL respectively (**Fig. 2**). Further, the two methods present an overall analytical agreement of 91.3%, 88.2% and 81.1% at commonly used, pathology dependent decision points of 1 µg/mL, 3 µg/mL and 5 µg/mL correspondingly (**Fig. 3**).

CONCLUSION

The Quantum Blue® Infliximab rapid test correlates very well with the LC-MS/MS method for infliximab trough level determination. Therefore, the rapid test fulfills high comparability to the LC-MS/MS method and represents a unique and modern analytical tool, for fast time-to-result and simplicity of usage in a more patient near medical environment.

References:

1. Vande Casteele, N. *et al.*, 2015, Trough Concentrations of Infliximab Guide Dosing for Patients with Inflammatory Bowel Disease, *Gastroenterology 148: 1320 – 29*
2. Willrich M.A. *et al.*, 2015, Quantitation of infliximab using clonotypic peptides and selective reaction monitoring by LC-MS/MS. *Int Immunopharmacol. 28(1): 513 - 20*

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