

Comparison of the new Cepheid HIV VL XC Assay with the established Abbott Alinity m in HIV-1 viral load measurement

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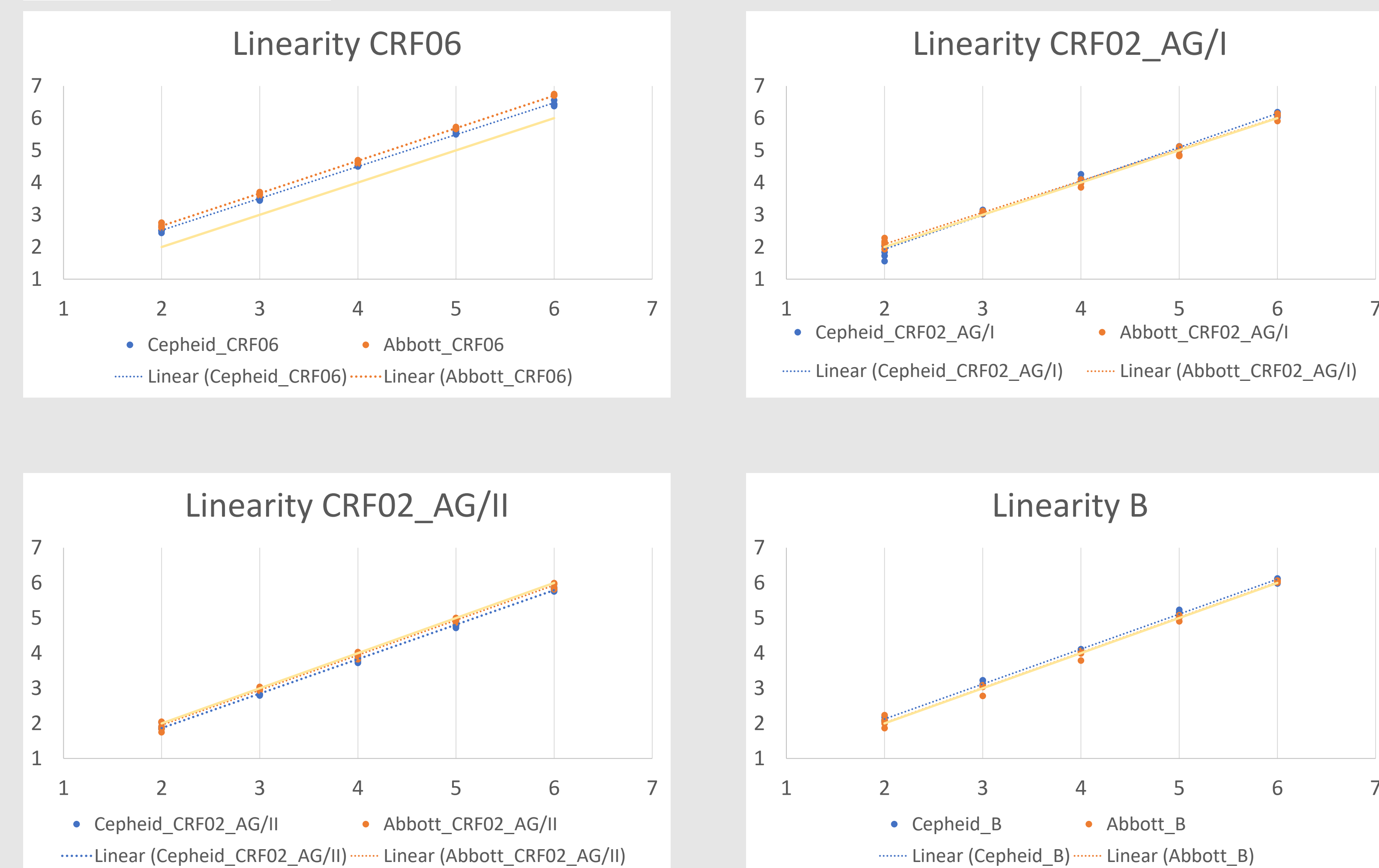
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Background

Xpert® HIV-1 Viral Load XC (HIV VL XC) test is a redesigned HIV-1 RNA quantitative assay that uses a dual target approach to minimize the risk of under-quantification from rare mutations in primerprobe binding regions. It is the same cartridge format on the GeneXpert® system. The manufacturer claims a lower limit of quantification (LLOQ) of 40 cps/mL and a lower limit of detection (LLOD) of 20 cps/mL.

A comparison with the Abbott Alinity m HIV-1 assay was performed., focussing linearity, variation at the low-end, non-B subtypes, and integrase-inhibitor resistant samples.

Fig. 2: Linearity



Methods

Fresh (n=164), frozen (mixed subtypes, n=99; with integrase mutations, n=20) and diluted (n=250) patient samples over the clinically relevant range of viral loads were tested. For linearity comparison we optimized two linear models minimizing the residual sum of squares (RSS) for each set of log-scaled viral loads. 3 samples with known under-quantification in the Xpert® HIV-1 Viral Load -test were retested with the HIV VL XC cartridges.

Fig. 1: Bland-Altman plot

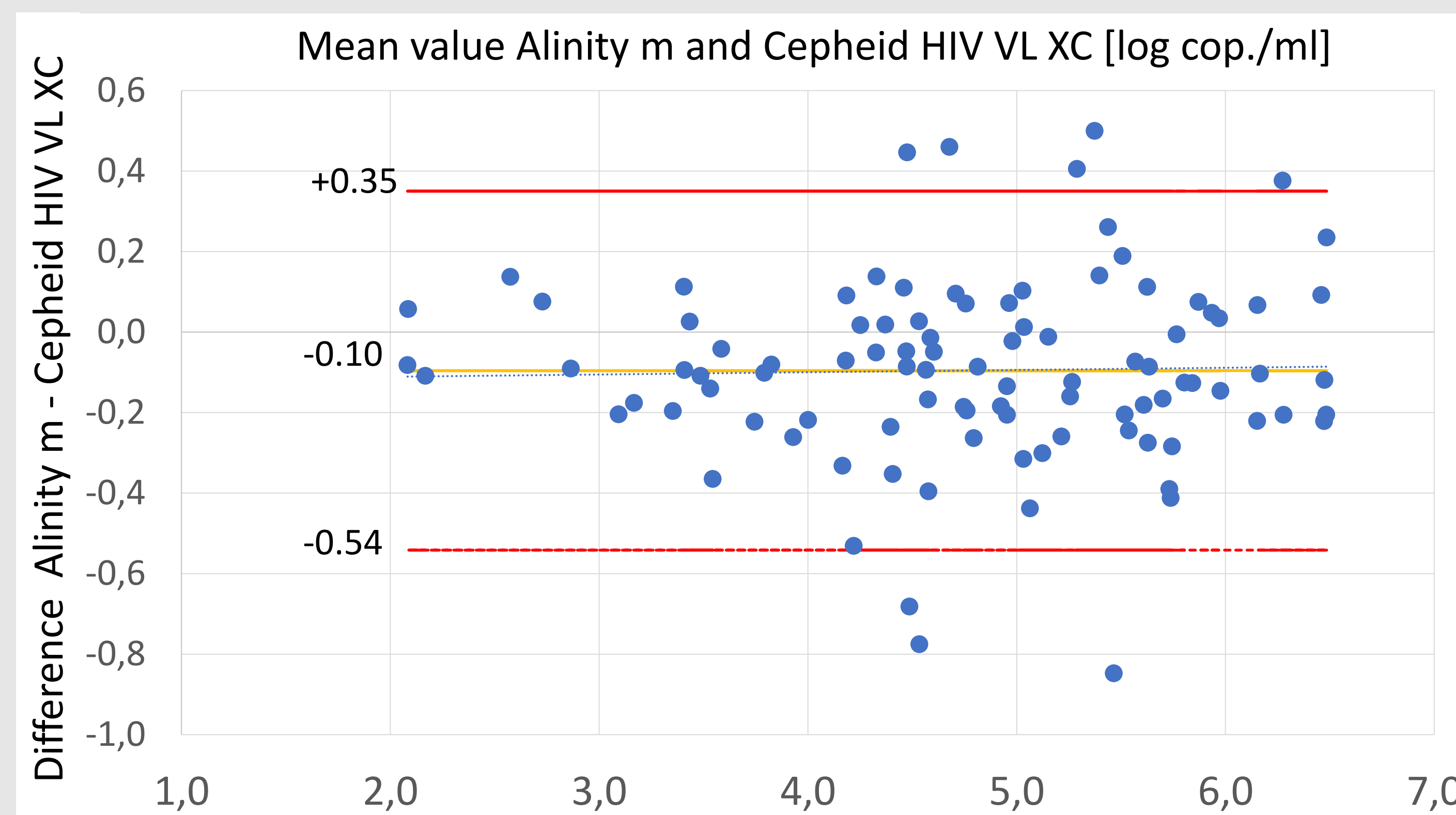


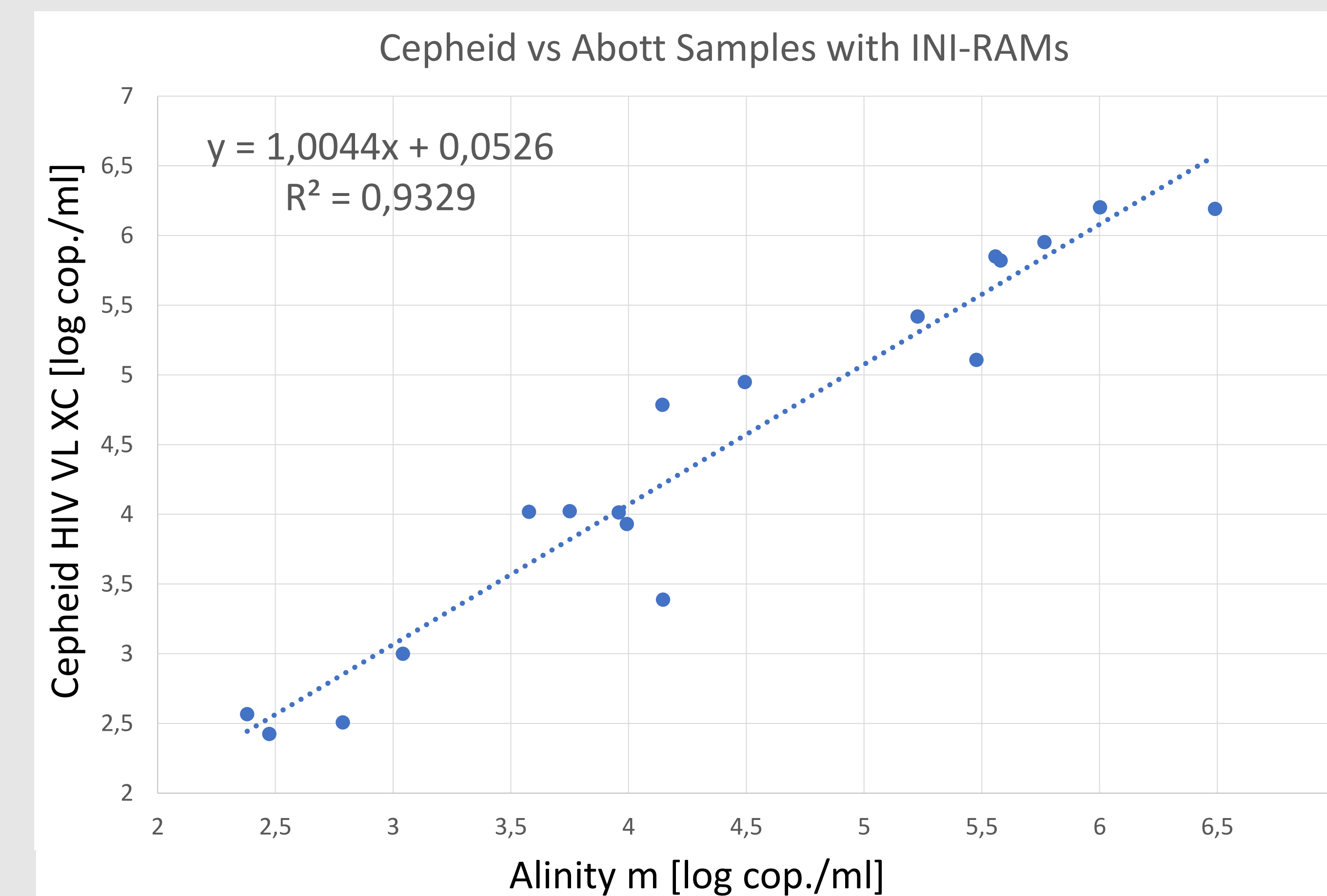
Table 1: Samples with known underquantification

Sample-ID	Xpert® HIV-1 Viral Load	Alinity m	Xpert® HIV-1 Viral Load XC
19440134702	not detected	140.000	105.000
19450606902	not detected	121.000	168.000
19451321902	not detected	n.d.	228.000

Results

HIV VL XC assay showed excellent performance in routine use even in samples with low viremia and integrase region mutations. The Cepheid assay reached a comparable specificity and sensitivity as the Abbott assay in 80 preselected (Alinity) fresh samples that were undetectable or below 50 cps/mL. Bland Altman plot (Figure 1) showed high concordance including 86/99 non-B subtypes. The mean difference was below 0.1 log cps/mL (95% confidence interval +/-0.45 log cps/mL). Good linearity was shown by serial dilution (subtype B, CRF06_cpx and two CRF02_AG) from 6 log cps/mL to 2 log cps/mL (Figure 2). Mutations associated with resistance in the integrase were not found to impact results (Figure 3). The samples with known under-quantification in the Xpert® HIV-1 Viral Load assay now showed only a small difference to the Alinity m assay of +/- 0.15 log cps/mL with the new HIV VL XC assay (Table 1).

Fig. 3 Viral load in samples with INI RAMS



Conclusions

The Xpert® HIV-1 VL XC test showed excellent correlation with Alinity m with high sensitivity, linearity and accuracy in the therapeutic relevant range for all tested HIV-1 subtypes. With a time to result of only 90 minutes this test is a safe, reliable and fast option for viral load monitoring and diagnosis of HIV-1 infection.