



Lubnaa  
Abdul-Razzaq

# Verification Of DiaSorin Liaison XL

Band 5 Biomedical Scientist  
Virology Department  
1<sup>st</sup> Class (Bsc)  
Applied Biomedical Science



## Introduction

Confirmatory testing is essential for diagnosis, treatments and immunity detection for infectious disease. It can provide insight into the length of time of infection such as avidity testing depending on the strength of binding to IgG epitopes, thus impacting treatment options provided (Prince and Lape-Nixon, 2014).

Confirmation is required by UK Health Safety Agency (UKHSA) guidelines and accounts towards official statistics (UK Health Security Agency, 2014)

Research was undertaken at the virology department at Manchester Foundation Trust (MFT). The DiaSorin Liaison XL is a chemiluminescent analyser, used for confirmation alongside other confirmatory analysers post screening testing, to confirm the presence of antigens or antibodies in patient serum samples (DiaSorin, 2023). The Lab has two XL analysers, known as XL1 and XL2 which test 21 different assays in relation to multiple infections such as; HIV, Syphilis, Cytomegalovirus, Herpes simplex virus, Epstein-Barr Virus, Parvovirus B19, Varicella-Zoster Virus, Chlamydia trachomatis, Hepatitis B and D.

Prior to this research the 21 assays were split across the two analysers. Due to a departmental move of the XL1, a verification was required of all 21 assays on the XL1 as this had not previously been done. The aim of this project was to verify results obtained using the DiaSorin Liaison XL analyser against the manufacturer range for the coefficient of variation (CV%) per each assay, following a departmental move. It is hypothesised that the results obtained will be in agreement with the manufacturer CV% range stated per each assay.

## Methodology

- Ethical approval was obtained from Manchester Metropolitan university and the virology department at MFT prior to starting.
- The XL uses Microparticle technology to determine the presence of antibodies in a patient sample (DiaSorin, 2023).
- Assay reagents contain magnetic particles coated in the target antigens, with an isoluminol derivative which binds to target antibodies if they were present in the sample.
- This then reacts with starter reagents to cause a light reaction expressed as a relative light units (RLU) depending on the presence of desired antibodies (DiaSorin, 2023).
- The verification consisted of running Assay controls with known values. It was comprised of reproducibility testing (done over 20 days) and repeatability testing (completed in one day).
- The analyser was set up daily by completing the maintenance, followed by then running the positive, negative and third-party controls for all on board assays. For the reproducibility the controls were ran once daily, for 20 days.
- For the repeatability testing only the positive and third-party controls were measured and the controls were ran 10 times in one.
- The control RLU values of each assay were input into a Unity real time daily for each assay. This software calculated the mean, standard deviation and subsequently the coefficient of variance (CV%).

## Results

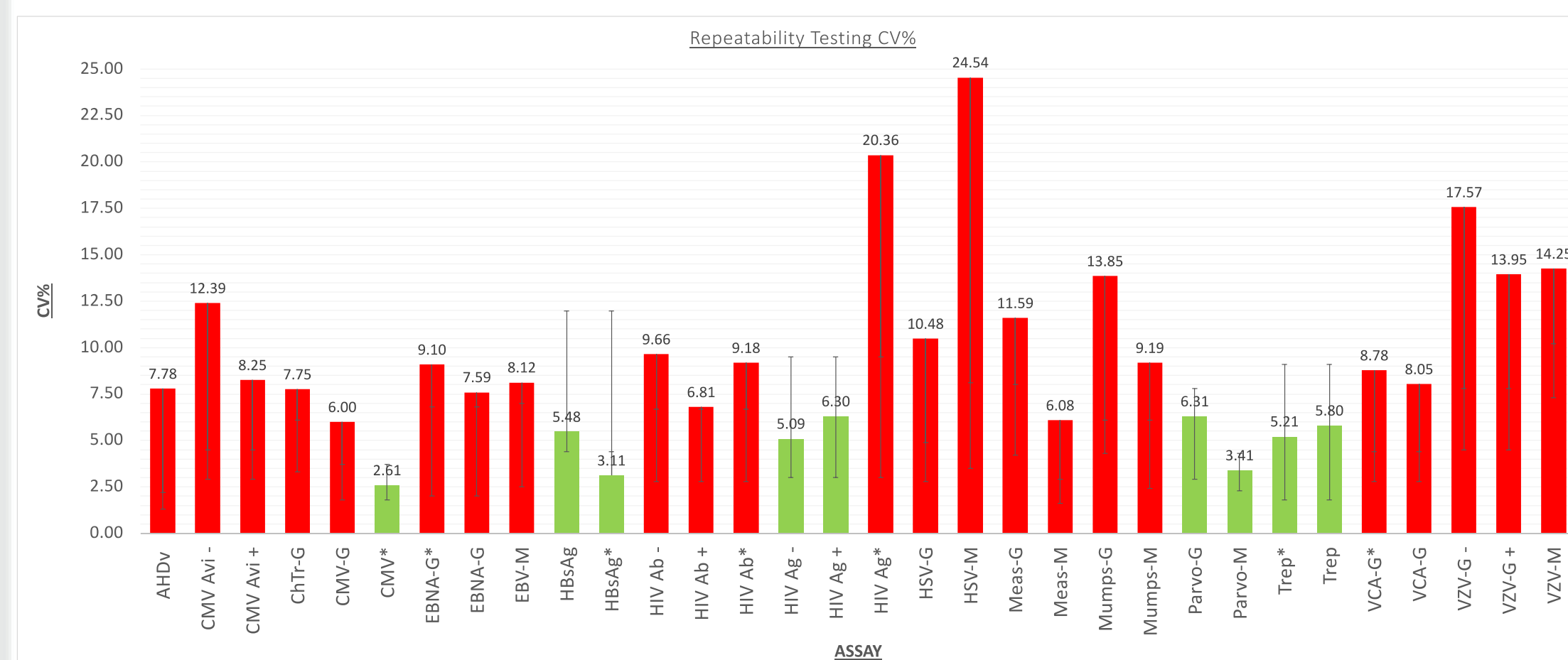


Figure 1. Observed reproducibility coefficient of variance results for all onboard assays with the error bars representing the manufacturers range. Assays Controls with a \* representing third party IQC (virotrol)

- As shown in Figure 1. 22/32 assay controls were found to be in agreement with the manufacture range stated per that assay and therefore passed the reproducibility element of the verification; the green representing those within the Manufactures CV% range; those in Red were above.
- The 10 Assays that had a greater CV% than the manufactures guidance range: were EBNA IgG and Virotrol, Measles IgG and IgM, Mumps IgG and IgM, Parvo IgG, VZV IgG and IgM.
- EBNA-G, Measles IgG and IgM, Mumps IgG and Parvo IgG all had an observed CV% of 2% more than the expected manufacturer CV%. Mumps IgM and VZV IgG and IgM had more than 3% above the manufacture CV% range
- Parvo IgG had a lot number change

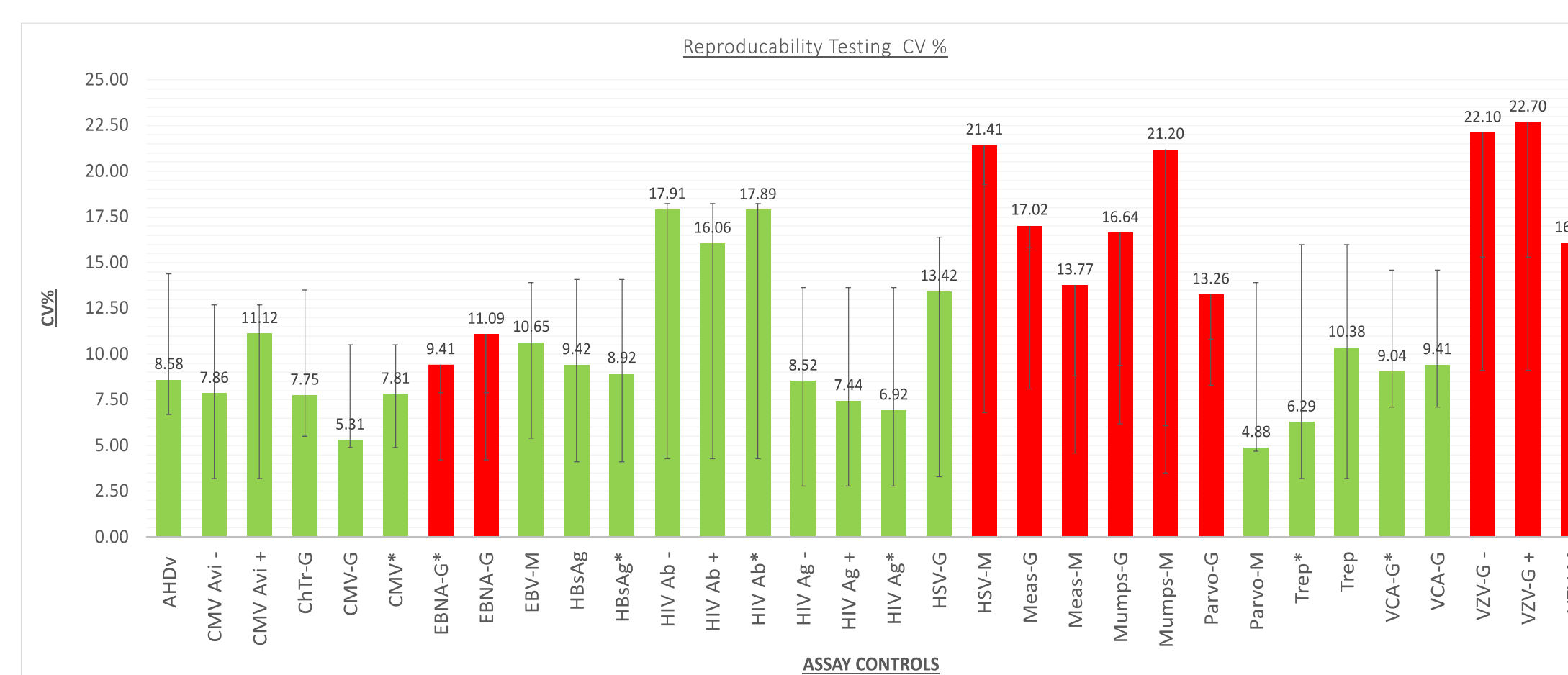


Figure 2. Observed repeatability coefficient of variance results for all onboard assays with the error bars representing the manufacturers controls with a \* representing third party IQC (virotrol)

- Only 9/32 Assay controls showed agreement with the manufacture range stated per that assay and therefore passed the repeatability element of the verification as shown in Figure 2.
- Assay controls that passed both parts of the verification were: CMV virotrol, HBsAg, HIV Ag, Parvo IgM and Treponema.
- The repeatability testing shows many assays as having out of range precision
- HSV IgM and HIV Ag Virotrol are outlier with the highest CV%.
- The HSV IgM, required many repeat tests for the reproducibility testing as the assay control failed on numerous occasions for having an RLU value below the assay range.
- HIV Ag Virotrol lot number changed for the repeatability testing.

## Discussion & Conclusion

This verification found that not all on board assays were in agreement with the manufacturer range of CV%. The trend of results showed that the assay controls that failed both reproducibility and repeatability had not been previously validated on this analyser (e.g. EBNA-G, HSV IgM, Measles, Mumps, VZ)

For the duration of the reproducibility testing the Lot number for the assay controls had remained the same except for the Parvo IgG, however for the repeatability testing there had been some lot number changes for some of the assay controls. This could partially account for the difference in mean and standard deviation resulting in the higher CV% Also, the repeatability testing was only completed for 10 repeats in one day rather than the desired 20 repeats. This was due to a lack of controls kits, there were not enough available to complete 20 repeats for all assays therefore only 10 repeats were completed on all of them. This resulted in a smaller sample size creating larger variation in results. This is likely the biggest cause for the out-of-range results as the pre-determined methods had to be adapted during research.

An engineer visit and change of reagent and control lot number was required because of the repeat HSV-M issues resulting in the CV being so high. This assay has been shown to have interference with other immunoassays causing false negatives (Vandervore et al., 2022) this could have also been a factor. The reproducibility of the HIV Ab assays were 1% above the manufacturers range and research shows that this assay has a high sensitivity of 83.1 to 98.8% (Gonzalez et al., 2022). The CV was lower than the reproducibility and may be due to the controls being left out for longer and continuously used causing dissipation

### Conclusion

To conclude as the HBsAg and Treponema were the only two assays that were in agreement with the manufacturer range of CV%. It is recommended that all other Assays that failed the verification be repeated in isolation and with more replicates for a larger sample size and a lowered risk of interference.

## References

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