**INTRODUCTION OF AN AUTO-DILUTION FOR ARCHITECT HBsAg QUANTITATIVE ASSAY**

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**Abstract**

Hepatitis B virus (HBV) is the most prevalent global viral infection and results in greater than one million deaths per year. Approximately 350 million people worldwide are chronic carriers of the virus. (1,2) and 2 billion people have been infected. (3) Hepatitis B surface antigen (HBsAg) is recognized as a key serological marker of acute and chronic HBV infection. (4) and can be detected in the serum several weeks before the onset of disease. The marker may also be detected through the acute and chronic stages of infection. Detection of HBsAg in a sample indicates that the individual is probably infected and the level of antigen present may be correlated with the relative level of infection and the severity of disease. (1), (2) and (6).

**Methods & Procedures**

Serum and Plasma samples positive for HBsAg (≥250 IU/mL) were sourced from Promedics. Samples were diluted using the manual dilution process, as recommended in the current ARCHITECT HBsAg Package Insert (List 6C36). The same samples were diluted using new assay files to enable an auto-dilution to 1:150 and 1:500. All samples were diluted by a factor of five manually and by factors of five hundred and one hundred and fifty through automated dilutions. All assays were performed using Abbott Diagnostics ARCHITECT reagents (List 6C36) with an additional diluent added to the reagent configuration. The additional reagent was composed primarily of negative human plasma and was manufactured as part of the assessment of the new dilution protocol.

Assessments were performed initially to assess the feasibility of two dilution protocols and subsequently to confirm the efficacy of one proposed protocol through design verification. A total of 244 samples were assessed through the study.

**Results**

- All sample sets, tested through both feasibility and design verification stage met the outlined requirements to demonstrate the effectiveness of the proposed auto-dilution for the ARCHITECT HBsAg assay.

- The initial sample sets of 241 samples showed slope values of 0.9 and 1.0 for the 1:150 and 1:500 dilutions respectively in correlation plots of manual versus auto-dilution (Table 1).

- The subsequent sample set of 103 samples was tested on the manual and 1:500 dilutions only and showed slope values of 0.96 and 0.97 in the correlation plots of manual versus auto-dilution respectively through Least Squares and Passing Bablok regression respectively (Table 2).

- Table 3 & 4 show the precision values (%CV) obtained for the automated dilution are better than for those obtained using a manual dilution process.

**Discussion**

The ultimate goal of HBV therapy is the maximum reduction or loss of HBAg (1) with but not necessarily including senescence to anti-HB. Prolonged suppression of HBV DNA has been shown to decrease the risk of development of chronic hepatitis and hepatocellular carcinoma. (22). Quantitation of HBV has a growing clinical utility in monitoring the therapy in the case of chronic Hepatitis B (23). Therapy in these cases may include treatment by pegylated interferon or with nucleos(t)ide analogues as a biomarker for the prognosis and response to therapy in cases of chronic Hepatitis B (23). It has been shown that HBsAg concentrations can correlate with Serum HBV DNA and intrapaticular cccDNA levels, with some variation in the different disease phases (21, 24, 25, 26). Quantitation of serum HBsAg may also be utilized to distinguish between different phases of chronic Hepatitis B infection (26) and serum HBsAg may act as a marker for the identification of inactive carriers (27).

The results presented indicate that an auto-dilution can be introduced to the current ARCHITECT HBsAg assay and will be facilitated by the introduction of new size codes 6C36-41 and 6C36-42 which will have an associated new assay file and an on-board diluent as part of the reagent kit.

Launch of the new size codes for the 6C36 assay is scheduled for the first quarter of 2012.

**References**