Introduction

Phenobarbital (also known as phenobarbitone) is a long-acting barbiturate drug that is frequently used by veterinarians as an anticonvulsant, which is a drug that helps to control seizures. Because phenobarbital acts as a central nervous system depressant, it can produce a spectrum of effects from mild sedation to total anesthesia. Careful dosing and regular monitoring of phenobarbital concentrations will ensure safe and effective treatment.

The Catalyst® Phenobarbital Test is an enzymatic heterogeneous competitive immunoassay that accurately quantifies phenobarbital concentrations in whole blood, plasma and serum in dogs and cats. The Catalyst Dx® Chemistry Analyzer is designed to complete all of the immunoassay steps, including the mixing, incubating, washing and reading, in order to process the immunoassay and produce reliable, accurate test results in the veterinary clinic.

Method Comparison

Materials and Methods: Serum or lithium heparin-treated plasma samples were collected from dogs and cats. All samples were analyzed for phenobarbital concentrations using the following reference clinical chemistry analyzers: Olympus® AU400, VITROS® 250 and the Catalyst Dx Chemistry Analyzer. All assays were performed according to the manufacturer's specifications. Data was plotted to determine regression statistics.

Results: Least-squares linear regression and calculation of the Pearson's coefficient of regression, R^2, were used to compare the overall agreement of phenobarbital concentrations between the two methods. Below are the correlation graphs for phenobarbital results using the Catalyst Dx versus the Olympus AU400 and the VITROS 250 showing correlation coefficient (R^2), slope, intercept and number of samples (n).

The results for the canine and feline samples are summarized in figures 1 and 2. The regression analysis for the Catalyst Dx versus VITROS 250 (figure 1) and Catalyst Dx versus Olympus AU400 shows that phenobarbital results with Catalyst Dx correlated well with both methods.
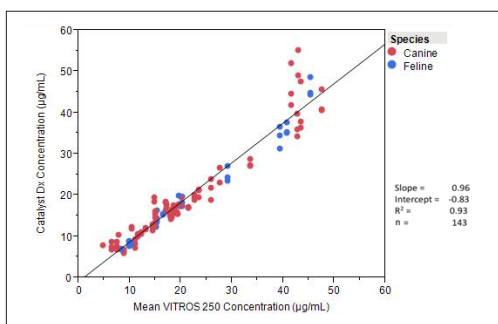

Figure 1: Catalyst Dx versus VITROS 250
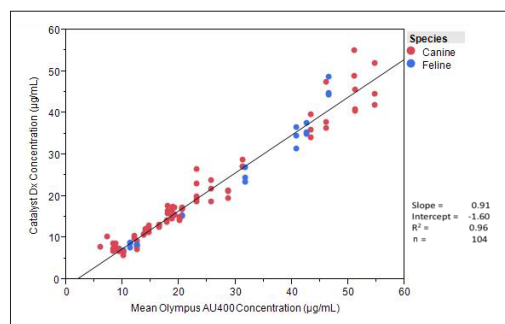Linear regression plot of phenobarbital concentrations in canine and feline serum.

Figure 2: Catalyst Dx versus Olympus AU400
Linear regression graph of phenobarbital concentration in canine and feline serum.

Precision:

Materials and Methods: Precision was assessed according to Clinical and Laboratory Standards Institute (CLSI) EP5-A method guidelines. Two levels of control fluid, VITROS® TDM Performance Verifier I and VITROS® TDM Performance Verifier II, were assayed on the Catalyst Dx® Chemistry Analyzer. There were 2 replicates run on 3 Catalyst Dx instruments in the morning and afternoon for 5 days, for a total of 20 replicates of each fluid per instrument. Total precision was calculated per CLSI EP5-A method guidelines.

Results: CLSI EP5-A method was used to compare the total %CV for each of 3 analyzers. Below is summary of the results, including mean concentration and percent coefficient of variation (%CV).

Catalyst Dx (Instrument ID)	Mean Concentration (μg/mL)	%CV
1	8.8	7.06
2	9.1	8.56
3	9.1	5.09
1	23.2	2.97
2	23.1	6.29
3	23.4	4.61

Figure 3: Within instrument—Total precision for 3 Catalyst Dx analyzers

Discussion

There was very strong agreement between the Catalyst® Phenobarbital Test and the 2 reference clinical chemistry analyzers, the Olympus® AU400 and the VITROS 250. The Catalyst Phenobarbital Test demonstrated good precision using the CLSI EP5-A method. A Catalyst Phenobarbital Test is recommended for optimizing phenobarbital dosing and regular monitoring in dogs and cats. In practice, when monitoring patients who are treated with phenobarbital, the overall clinical picture and clinicopathologic test results must be considered.

Conclusion

The Catalyst Dx Chemistry Analyzer and Catalyst Phenobarbital Test produce accurate results when used to quantify phenobarbital concentrations in whole blood, plasma and serum samples from dogs and cats. The new immunoassay system demonstrates excellent correlation with Olympus AU400 and VITROS 250 results and provides an accurate, reliable and convenient option for veterinarians who wish to use their in-house laboratory to optimize dosing and to monitor animals treated with phenobarbital.

IDEXX LABORATORIES