Electrolyte Assay Performance on the IDEXX VetStat® Electrolyte and Blood Gas Analyzer

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Introduction
The VetStat® Electrolyte and Blood Gas Analyzer provides reportable ranges that cover canine, feline and equine variability and species-specific reference ranges.

Material and Methods
Canine, feline and equine whole-blood samples were analyzed at 15 different laboratories including practices, a top U.S. veterinary hospital and our own research-and-development laboratory. Assays were run on the VetStat analyzer and the IDEXX VetLyte® reference system within two hours. The results for each sample at our site are from three of six different VetStat analyzers. Other results are from one VetStat analyzer at each of ten sites and two VetStat analyzers at each of four sites. There was one VetLyte analyzer at each site.

There were several sources of variability in the study, in addition to different analyzers and laboratories. Three different VetStat cassettes were used: Electrolyte, Fluid Therapy and Respiratory Therapy. Some samples were analyzed fresh; others were stored on ice for 23-27 hours for canine and feline, and 4-6 hours for equine. The complete study spanned one year and used multiple lots of each cassette type.

Data was analyzed by standard linear regression.

Results

<table>
<thead>
<tr>
<th>Material</th>
<th>Sodium</th>
<th>Potassium</th>
<th>Chloride</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Samples</td>
<td>694</td>
<td>609</td>
<td>570</td>
</tr>
<tr>
<td>Concentration Range [mmol/L]</td>
<td>91-188</td>
<td>1.9-9.55</td>
<td>77-158</td>
</tr>
<tr>
<td>Number of Cassette Lots</td>
<td>26</td>
<td>26</td>
<td>24</td>
</tr>
</tbody>
</table>

The reportable range for K is 0.8 to 10 mmol/L. The K correlation was good, with slope >0.90 and the y-intercept 0.1% of the mean result. The r² was excellent. The mean bias is 0.8% of the mean result.

Evaluation of r²:
Ion-selective electrodes require periodic maintenance and should be replaced every 9 to 12 months. As these electrodes age, the results they give for the same sample tend to decrease. In addition, the range of results that can be reported becomes narrower. The sodium electrode is the most sensitive to aging. If a laboratory does not replace its sodium electrode regularly, performance of the reference method can change. For example, the following graphs show correlation data from two of the sites in this study. This data is for the same cassette lot that was used at both sites.

Conclusions
The VetStat® analyzer gives accurate and reproducible results on veterinary whole-blood samples compared to ion-selective electrode methodology. Greater scatter in the sodium comparison can be attributed to lack of strict maintenance of the ion-selective reference method at some of the sites. Performance characteristics were considered acceptable for use with canine, feline and equine samples.