

Comprehensive Avian Diagnostics Made Possible With the Abaxis VetScan and the Avian/Reptilian Plus Rotor.

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Avian diagnostic testing is complicated by several limiting factors:

- Sample size
- Critical state of patients upon presentation
- Sample quality susceptibility relative to sample handling and
- Availability of the "right" tests for avian patients

The Avian/Reptilian Plus, (A/R+), diagnostic rotor for use with the VETSCAN® Point-of-Care Chemistry Analyzer has all but eliminated these common limitations of avian diagnostic testing. First, because the VetScan analyzer requires less than 100 microliter sample size, the sample size limitation has to a large extent been overcome. Now even avian patients such as budgies and cockatiels can be conveniently tested. As more patients are tested and a reference interval data base is expanded, we will continue to improve our diagnostic capabilities for these species.

Point of care analysis is particularly important in avian patients since they often are critical when presented, and deteriorate rapidly. Many practitioners opt to send avian samples to an outside lab, but this can create an unacceptable lag time for the retrieval of results. Patients often expire while waiting to be diagnosed. There are other potential problems which arise from sending samples to an outside lab. These arise because accuracy of results can vary with sample hold time, shipping temperatures, handling by the technical operator, etc.

In the past, even when all above factors are resolved by performing diagnostics in-house, the diagnostic panel itself often remained incomplete, until now. Bile Acids, one of the most critical of all avian analytes, was unavailable in an in-house analyzer.

Now, with the addition of bile acids, the A/R+ panel measures virtually all the analytes that represent the most important areas of concern in avian patients. We will review hepatic, renal, electrolytes and albumin/ globulin assessment for infectious diseases.

HEPATIC:

Leading the selection are the tests that relate to hepatic condition and functioning. In order to fully assess the condition of the liver, one must consider four analytes: AST, CK, Bile Acids, and Albumin.

- AST is a measure of hepatocellular leakage. In addition to the liver, AST can also be released by myocytes. An elevated AST therefore suggests leakage from either hepatocytes or myocytes. Since CK is produced by myocytes, but not hepatocytes, an elevated AST in the absence of an elevated CK suggests hepatocellular leakage and therefore liver disease or damage.
- Bile Acids concentration is a significant and reliable indicator of liver function. Function is the other consideration when

evaluating the condition of the avian liver. Pre-release testing by Abaxis suggests that a Bile Acids concentration of above 95 micromoles/ L indicates that liver dysfunction may exist. The tremendous differences in avian species make it impossible to delineate one particular value as a "high normal limit". Also, different methodologies will cause normal ranges to vary from lab to lab. This can be exacerbated by the fact that different avian species possess different combinations of individual bile acids, and the ranges will vary depending on the method's sensitivity to each of the bile acids. Experience ultimately dictates the range that is considered normal vs. suspect dysfunction. Immediate ante-mortem concentrations may approach 350 or more. While the actual concentration may exceed the analyzer's linear range, clinically there is little difference in the prognosis of a patient with a Bile Acids concentration of 200 vs. one of 350. Both are critical and in need of equal degrees of intensive care. In mammals, a failing liver will first lead to plasma concentrations of Bile Acids above normal, then, as dysfunction increases, below normal. Avian patients appear to die before this fall in Bile Acids concentration occurs, therefore the rise-and-fall phenomenon is not observed. As such there is really no "below normal" value for Bile Acids concentration in birds. Readings of "<35" should be regarded as normal. An exact number can be obtained from the VetScan by printing the error codes, but this number becomes an estimate, due to the linear range of the methodology. Again, this is clinically irrelevant, since only values above normal are significant.

- It should be noted that the normal range for Bile Acids concentration in birds is higher than in mammals, so the mammalian Abaxis rotor containing Bile Acids is not appropriate for the determination of Bile Acids concentrations in birds.
- The tell-tale end stage of liver disease in avian patients is a fall in Albumin concentrations.

RENAL:

The next set of parameters offered by the A/R+ that is extremely valuable in avian diagnostics is that which relates to kidney function. The Uric Acid, Ca⁺, and P⁺ can collectively be used to assess degree and chronicity of disease of the renal system. Simplified, an elevated Uric Acid, (above approximately 13), suggests compromised kidney function. An elevated P⁺ relative to Ca⁺ suggests chronicity. The lower the Ca⁺:P⁺ ratio the more severe, (allegedly), the renal dysfunction. Acute, transient elevated uric acid concentration due to pre-renal conditions should not affect the Ca⁺:P⁺ ratio.

ALB/ GLOB RATIO

Avian patients commonly present with infectious diseases. The classic method for the detection of infectious disease is the CBC. Unfortunately, this only assesses the cellular side of the avian immune system, and does nothing to evaluate the humoral immunity. The A/R+ provides useful and reasonably accurate measurements of avian Total Protein and Albumin concentrations, with a calculated Globulin level. The resultant A:G ratio is extremely useful in screening for possible elevations in Globulin, and potentially Gamma Globulin levels. While

Gamma Globulin determinations cannot be obtained directly from the A/R+, a decreased A:G ratio, due to increased Globulins in general, strongly suggests the need for a plasma electrophoresis to assess individual protein concentrations. Many times, it will be realized that a patient has elevated Gamma Globulins, and therefore associated illness, while the CBC remains normal. The illness can be detected and resolved before the end stage is reached.

ELECTROLYTES

Lastly, the A/R+ contains K⁺ and Na⁺, analytes that are useful in critical cases. Variations from normal in these analytes suggest life-threatening conditions that must be immediately addressed.

The A/R+ diagnostic rotor revolutionizes avian diagnostics. The extremely small sample requirements combined with the completeness of the avian biochemistry panel on the rotor provides the practitioner with almost everything needed to provide ideal care to avian patients.