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In this article, the normal kinetics, morphology and other unique characteristics of equine erythrocytes are reviewed, the influence of the spleen on erythrocyte values is discussed, and selected normal reference intervals are presented. In addition, the classification and causes of anemia and polycythemia are reviewed and the appropriate laboratory tests for accurate diagnosis are presented.

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Evaluation of equine bone marrow and lymph node samples can provide the definitive diagnosis in some cases, and may provide useful information in other cases. Some newer techniques, including immunophenotyping of cells and clonality assays, provide the capability to more precisely identify cells, both as to origin and malignancy. Use of these techniques on equine bone marrow and lymph node samples, and compiling of the data, will eventually provide invaluable information about equine neoplasia that will greatly improve the ability to predict tumor behavior and response to therapy.

## **Blood Proteins and Inflammation in the Horse**

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Mark V. Crisman, W. Kent Scarratt, and Kurt L. Zimmerman

Activation of the host response to infection, the “acute-phase response,” is a highly organized physiologic reaction that includes changes in concentrations of plasma acute-phase proteins (APPs). The APPs are increasingly being used as markers for prognosis and monitoring response to therapy along with general determinants of equine health. Use of APPs in veterinary medicine is becoming more widespread as more commercial diagnostic kits are being validated. This article reviews the salient features of APPs and examines their current application and potential utility in equine inflammatory disorders.

## **Immunodeficiency Disorders in Horses**

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Mark V. Crisman and W. Kent Scarratt

Immunodeficiencies are characterized as primary (genetic) or secondary (acquired). Primary immunodeficiencies are relatively uncommon; however, clinically, they present a significant challenge to the practitioner, especially if the underlying disorder goes unrecognized. Secondary immunodeficiencies may present at any age, but failure of passive transfer in neonatal foals is most commonly encountered. This article provides a general overview of clinical signs and diagnosis of primary and secondary immunodeficiencies currently recognized in horses.

## **Diagnostic Equine Serology**

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Kurt L. Zimmerman and Mark V. Crisman

This article is presented with two main goals: (1) to provide equine clinicians with a resource for identifying types of serum tests available and (2) to outline briefly the necessary sample type, assay principle, and relative strengths and weakness of the various methods. Specific etiologies are presented and grouped by clinical diagnosis categories, along with brief comments concerning each disorder and its relevant diagnostic assays. This organization provides an abstracted list of infectious disorders commonly considered for the various clinical presentations and a summary of available serologic tests for narrowing the differential diagnosis list. The reader is also provided with a list of specific laboratories that perform the diagnostic assay for the mentioned disorders.

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Marjory B. Brooks

The most common cause of hemorrhage is vascular injury; however, the possibility of hemostatic failure should be considered in the initial differential diagnosis. This article provides an overview of preliminary screening and definitive tests to identify hemostatic defects in horses.

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Jane E. Axon and Jonathan E. Palmer

The neonatal foal is in a period of transition between fetal and extrauterine life. The clinicopathologic findings in this period often reflect the in utero environment; thus, results need to be interpreted with the knowledge of changes that intrauterine life may produce. These changes can also assist the veterinarian in identifying a foal at high risk for developing clinical problems. The veterinarian should also be aware of the normal variations in clinicopathologic findings that occur as the foal matures. As with results from all diagnostic testing, the clinicopathologic results need to be interpreted with reference to the physical examination findings of the foal.

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Catherine J. Savage

Urinary specific gravity (USG) measurements are underused by equine ambulatory veterinarians. Urinary dipstick and USG findings can assist in the diagnosis and prognosis of many disease processes in the horse. Simple methods for measurement of the glomerular filtration rate and urinary biochemical markers can improve equine urinary diagnostic abilities in critical care patients. Fractional excretion of electrolytes and minerals assists in fluid care and in management of nutrition of horses.

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Catherine McGowan

Clinical pathology is frequently used in racehorses to screen for "fitness" to race and to screen for disease that may affect performance. The role of clinical pathology in exercise testing of racehorses is important, especially in the area of blood lactate responses to exercise. This article discusses the use of resting and dynamic clinical pathology in the racehorse, especially in respect to investigation of the state of training (or fitness) and detection of subclinical performance-limiting disease.

## **Bronchoalveolar Lavage: Sampling Technique and Guidelines for Cytologic Preparation and Interpretation**

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Andrew M. Hoffman

Bronchoalveolar lavage (BAL) is a method for the recovery of respiratory secretions that line the peripheral airways and alveoli. Overall, BAL is considered very safe and sufficiently sensitive to detect inflammation at the cytologic level. The good correlation

between BAL differential cell counts and exercise-induced hypoxemia or lactic acidosis, airway obstruction, or airway responsiveness attests to the relevance of BAL cytology to the structure and function of the equine airways. Thus, an important advantage of BAL over tracheal wash cytology is that BAL cytology relates well to the clinical signs and pathophysiologic consequences of inflammatory airway disease.

## **Equine Synovial Fluid Analysis**

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Catherine M. Steel

The most important application for synovial fluid (SF) analysis in the horse is in the diagnosis of synovial sepsis. Misdiagnosis of synovial sepsis is costly, and SF analysis makes correct diagnosis more likely, although far from certain. The precision of diagnosis may be increased with polymerase chain reaction analysis for detection of bacterial DNA in SF and with assays for various enzymes and cytokines. These tests are currently not widely available, however, and routine SF analysis remains of prime importance in diagnosis.

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