ACUTE PHASE PROTEINS

The acute inflammatory response results in a widespread and complex cascade of cytokine and lymphokine production (interleukins, interferons, eicosanoids etc). “Acute phase proteins” (APP) is the collective term for proteins which are synthesised and released from the liver in response to inflammatory cytokines. These proteins include fibrinogen, serum amyloid A, caeruloplasmin, C-reactive protein, haptoglobin and several others. A panel of these acute phase proteins are used in human clinical pathology, however in many veterinary laboratories fibrinogen is the only APP which is measured. The LEH Laboratory offers serum amyloid A which is frequently a more sensitive indicator of inflammation than fibrinogen alone and may be more useful in monitoring responses to infection in the first few days of disease.

Fibrinogen

Fibrinogen can only be measured in plasma (EDTA or citrated). It is normally less than 3.7 g/L and may rise as high as 10-15 g/L in severe inflammatory cases. Therefore the “pathological range” is approximately 4 x the physiological range. Plasma fibrinogen concentrations may take 24-48 hours to increase above normal ranges following initiation of an acute inflammatory response.

Serum amyloid A (SAA)

SAA responds more rapidly than fibrinogen (within 24h) and may therefore be more helpful in assessing acute inflammatory disease. Furthermore, most normal horses have SAA concentrations close to 0 and with severe inflammatory disorders this can rise to approximately 1000 mg/L creating a massive pathologic range. Compared with fibrinogen this allows a far greater ‘grading’ of severity of the inflammatory process and more sensitive monitoring of progress.

Globulins

Globulins are often seen to increase in inflammatory disease as most of the acute phase proteins are included in the globulin fraction. There is no evidence of any benefit of subclassifying globulins further using serum protein electrophoresis as this technique rarely provides further useful diagnostic or prognostic information unless a plasma cell myeloma is suspected. In addition to being a non-specific indicator of chronic inflammation, hyperglobulinaemia is seen commonly with hepatopathy.

Albumin

Serum albumin is often referred to as a “negative acute phase protein” as albumin levels can fall slightly with inflammation (especially in chronic cases) as synthesis of positive acute phase proteins listed above is accelerated at the expense of albumin synthesis. Hypoalbuminaemia as a result of inflammation tends to be mild. Hepatopathy is also a potential cause of mild hypoalbuminaemia. Marked hypoalbuminaemia (<20 g/L) is almost invariably indicative of loss of albumin rather than merely reduced synthesis and the most likely causes are protein-losing enteropathy or loss into an effusion. Though rare, protein losing nephropathy as a result of glomerular disease is another potential cause of hypoalbuminaemia.