TIME-DEPENDENT ARTIFACTS IN CLINICAL PATHOLOGY

Delay between collection of a blood sample and processing can result in *ex vivo* changes in biochemical analyte activities and concentrations.

Aspartate aminotransferase (AST), lactate dehydrogenase (LDH), creatinine kinase and total bile acids were significantly increased in a recent study assessing changes in biochemical analytes in stored whole blood and serum analysed up to 24-72hrs post-sampling (Rendle *et al* 2009). Both AST and LDH are found in higher concentrations in erythrocytes and thus can be increased following haemolysis. The magnitude of these increases is not substantial enough to affect clinical interpretation.

Ammonia has been reported to be significantly elevated following 48hrs stored at -20 °C. Analysis of serum samples kept at room temperature demonstrated moderate elevations in ammonia concentrations measured over a 24hr period. Hence it is not possible to gain a reliable blood ammonia estimation from samples taken in practice and posted to a referral laboratory.

Glucose is reduced in stored whole blood due to *ex vivo* glycolysis. This is minimised by the use of potassium oxalate/sodium fluoride, which acts as a preservative. Recent work suggests that glucose decreases using these tubes, but it is not as marked a decrease in comparison to plain serum tubes (Rendle *et al* 2009). Thus, it is appropriate to use potassium oxalate/sodium fluoride (grey topped) tubes to transport whole blood for glucose measurement.

Electrolytes such as potassium, magnesium and phosphate have a greater concentration within erythrocytes than in plasma. It has been noted that these electrolytes increase if measured in stored whole blood due to leakage from erythrocytes or haemolysis. Inversely, leakage from erythrocytes or haemolysis results in dilution of sodium and calcium because they are present in lower concentrations within erythrocytes rather than plasma. Therefore, it is prudent to centrifuge whole blood and transport the separated serum for analysis of electrolytes.

White blood cells show some unusual changes when samples are stored. As a sample ages, the nuclei of polymorphonuclear (PMNs) condense. This may result in an artificial relative lymphocytosis as the cells could be mistaken for lymphocytes.

Rendle DI, Heller J, Innocent GT, Durham AE (2009) Stability of common biochemistry analytes in equine blood stored at room temperature. *Equine Veterinary Journal* 41 (428-432).