

## **PROJECT REVIEW**

### **"Markers of fluid balance: Evaluating osmolality, albumin and blood lactate for the athlete biological passport"**

**Dr. D. Eichner, Dr. S. Smeal, Dr. A. Fuller** (Sports Medicine Research and Laboratory Testing, USA)

The ABP was proposed by WADA nearly a decade ago to longitudinally monitor and define an athlete's individual blood variables in an attempt to indirectly detect doping. The ABP relies on the monitoring of blood variables sensitive to the administration of performance enhancing drugs (PEDs) to identify abnormalities in an athlete's profile that cannot be explained by a normal physiological or pathological condition. When reviewing irregularities in an athlete's blood profile, the experts must consider the effect confounding factors such as physical exercise have on the ABP. Indeed, studies have shown decreases in the absolute blood volume and increases in hemoglobin (HGB) concentration when subjects were acutely dehydrated. The ability to characterize an athlete's hydration status at the time of blood collection would assist experts when reviewing irregularities in the ABP. The most widely used indicator of hydration status is osmolality, a measurement of the electrolyte-water balance in the body. Albumin is the most abundant protein in plasma and is largely responsible for attracting water into the circulatory system. Elevated albumin is typically a sign of dehydration. As lactate and other metabolites accumulate in working muscles, plasma water will be pulled to the working muscles thereby reducing plasma volume and elevating albumin concentration. Interestingly, increases in blood lactate correlate to decreases in plasma volume after maximal exercise. Therefore, it may be possible to indirectly assess relative plasma volume by measuring blood lactate. The purpose of the present study is to compare the changes in serum albumin, osmolality and lactate, potential markers of fluid balance, in the context of the ABP when athletes are subjected to cycling trials of varying levels of dehydration and exercise intensity. The inclusion of additional biomarkers in the ABP responsive to whole body hydration will strengthen the sensitivity of the ABP.