

Investigating the use of a Point of Care salivary IgG test in the sporting environment

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Introduction

The use of salivary diagnostics within the sporting community has gathered momentum in recent years; identifying hormone levels to assist in the optimisation of workloads, or antibodies such as sIgA to assess individual recovery status and potential immune suppression. Immediate feedback for coaching and support staff via a Point of Care (POC) test would give a significant time advantage over standard laboratory techniques, which often reveal data to sporting squads only days later.

This paper assesses a new point of care product for the rapid determination of salivary IgG in comparison to standard laboratory ELISA determination.

Methods

A total of 45 saliva samples were taken from a cohort of English Premier League Senior and Academy soccer players (22.4 ±7.2 yrs) using IPRO Oral Fluid Collection (OFC) kits. The OFC kits collect 0.5mL of oral fluid and contain a colour changing volume adequacy indicator within the swab, giving collection times typically in the range of 20-50 seconds (Jehanli et al., 2011).

The samples analysed in this study were taken during routine monitoring: before training sessions, towards the end of a competitive season. The same samples were analysed to determine sIgG concentrations via laboratory ELISA and POC test using Lateral Flow Device (LFD) specific to IgG. This platform has previously been validated for sIgA in a similar manner (Dunbar et al., 2011).

Two drops of saliva/buffer mix from the OFC were added to the sample window of the LFD. The liquid runs the length of the test strip via lateral flow, creating a control and test line visible in the test window. Five minutes after the sample is added, the test line intensity is measured in an IPRO LFD Reader. The test line intensity is inversely proportional to the IgG concentration in the sample giving a quantitative value. The same samples were then taken to a



laboratory for subsequent analysis, which was started within four hours of collection.

Measurement range for ELISA was 1.75 - 105 µg/ml and for the POC test was 1.6 - 120 µg/ml.



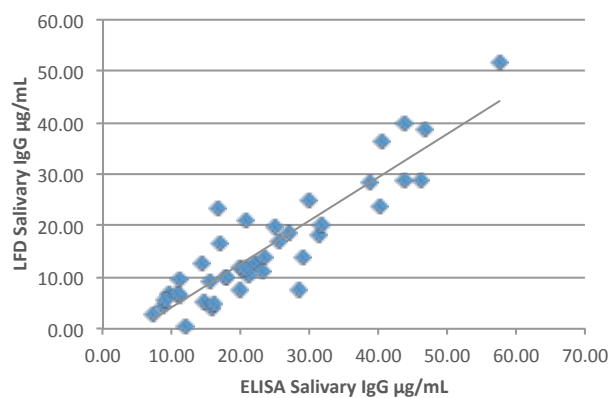
The IPRO LFD showing both the Control and Test Line

Results

Four samples exceeded maximum values on both platforms and were excluded from the analysis. Salivary IgG concentrations for the remaining samples measured via ELISA ranged from 7.26 - 57.54 µg/ml and with the POC test from 2.26 - 51.81 µg/ml, with the mean difference 7.90 µg/ml. The relationship between the salivary IgG values obtained using the ELISA and LFD is shown in Figure 1 and was represented by the formula:

$$y = 0.83x - 3.8109, \text{ with } R^2 \text{ 0.8107.}$$

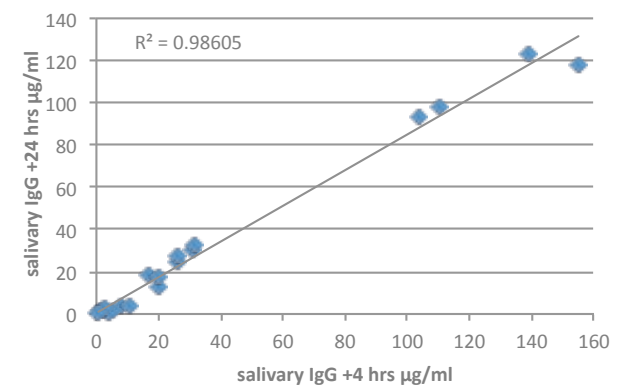
Figure 1: Relationship between sIgA determination from ELISA & IPRO LFD



One of the most important aspects of such technology for the applied user is the repeatability of measurement. Athletes are more concerned about how their readings vary on a longitudinal basis, rather than how the LFD performs in comparison to the ELISA (which is far from a gold standard in its own right). In this regard the IPRO device was seen to perform well, when the same samples were measured on two separate occasions 24 hours apart (Figure 2).

In this case a total of 20 samples were measured on the POC device 4 hours post collection (the same time as analysed by ELISA) and 24 hours after this time-point, with good agreement between the two timepoints (R^2 0.986).

Figure 2: Repeatability of salivary IgG LFD measurement, same sample 24 hours apart



Conclusion / Practical Implication

The point of care test shows good agreement with the ELISA method for the determination of salivary IgG. Given the quick data turnaround and efficiency in terms of cost, it represents a suitable alternative method for use in sports teams. Given the fact that IgG concentrations can now be performed on site, in the training environment alongside other markers such as sIgA and cortisol on the same device; this test represents a true paradigm shift in the way athletes can be monitored, in that results are gained within seven to eight minutes and subsequent intervention strategies can be applied immediately where appropriate.

References

Dunbar J, Jehanli A & Skelhorn S (2011) Investigating the use of a point of care sIgA test in English Premier League Soccer players. *Proceedings 10th Symposium Intl Soc. Ex. Immunol.*

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The IPRO OFC, LFD and LFD Reader



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