

EVALUATION OF IMMUNE DISTURBANCES DURING RECOVERY FROM AN INTERNATIONAL RUGBY GAME.

Cunniffe Brian¹, Jones Ken², Hore Andrew³, Whitcombe Dean⁴, Baker Julian⁴, Davies Bruce⁴

(University of Glamorgan & Wales Rugby Union¹, Dept Biomedical Sciences, UWIC², Wales Rugby Union³, University of Glamorgan⁴, United Kingdom)

Intense exercise has been previously shown to cause temporary impairments in immune function. While previous studies have examined immune disturbances in field sports such as soccer (Malm et al, 2004), to date, no study has assessed changes following an international rugby match. Rugby union is an intense game where a large proportion of muscular trauma is thought to occur as a result of the high collision characteristics within the game. Investigation of the contemporary game demands may shed light on recent discussions regarding excessive player fatigue.

PURPOSE: To evaluate possible immunological perturbations in a cohort of elite rugby union players before and after an international game. **METHODS:** Ten players [mean (\pm SD): age 26.4 (2.5) yr, height 186.5 (8.7) cm, weight 103.1 (13.5) kg, VO_{2peak} 53.2(3.5) $ml.kg.min^{-1}$] agreed to participate in the study passed by the local ethical committee of the University of Glamorgan. Markers relating to the acute phase response, immune function and tissue damage were assessed from blood samples collected on the morning of the game, immediately after, and 14 & 38 h into a passive recovery period. All players were weighed (semi-nude) before and immediately after the game for estimated changes in hydration status. Whole blood was assessed for the number of circulating blood neutrophils, monocytes, natural killer (NK) cells, lymphocytes and lymphocyte subsets. Blood serum/plasma was assessed for changes in cortisol, high sensitive C reactive protein (hs-CRP) and total creatine kinase (CK). Functional immune response (neutrophil degranulation) was assessed via bacteria stimulated elastase release (total elastase release & elastase release per neutrophil). **RESULTS:** Players lost 1.4 ± 0.7 kg in body mass during the game (ambient conditions 11°C; 40% relative humidity). Perturbations were observed in all markers across time. Significant increases ($P < 0.05$) in serum cortisol, blood neutrophil and monocyte counts were seen immediately after and 14 h into recovery. Peak levels of CK and hs-CRP and were recorded 14 h and 38 h post exercise respectively. Significant correlations were observed between blood neutrophilia and CK-38 h with player tackle count ($r = 0.79$ and $r = 0.86$ respectively; $P < 0.05$). Significant decreases ($P < 0.05$) in T-cytotoxic ($CD4^+CD8^+$) and NK ($CD3^+CD16^+CD56^+$) cell counts were observed immediately post exercise. A significant decrease ($P < 0.05$) in LPS-stimulated elastase per neutrophil was observed immediately post exercise and concentrations did not achieve pre game values until 38 h post exercise. **CONCLUSION:** A game of international rugby elicits profound disturbances in host immunity. This decreased immune response may last up to 38 h. The

magnitude of these changes are likely to be resultant from structural damage/stress achieved during game collisions.

Reference: Malm C et al.(2004) Acta Physiol Scand.180(2):143-55.

Keywords: Rugby, Immunology, Recovery