SALIVARY BIOMARKERS AND TRAINING LOAD DURING TRAINING AND MAJOR COMPETITION IN PARALYMPIC SWIMMERS

Ciara Sinnott-O'Connor

Supervisor: Dr Giles Warrington

Secondary Supervisor: Dr Tom Comyns

Paralympics IRELAND

UNIVERSITY of LIMERICK
OLLSCOIL LUIMNIGH

SPORT IRELAND INSTITUTE

Background and Rationale

- A common misconception in sport is the belief that to improve performance one must increase training (Bishop et al., 2008)
- Mismanagement of training load is not always overload and can be insufficient load (Gabbett, 2016)
- Most valuable output of accurate athlete load monitoring is the comprehensive understanding of the **individual** tolerance to training and competition (Coutts et al., 2004)

Background and Rationale

- Salivary profiling is non-invasive, easily accessible and can be measured quickly in lab or field settings
- Weekly monitoring allows for trends and patterns to develop
- Research has shown immune and stress salivary biomarkers to respond to increases in training and competition stress (Papacosta and Nassis, 2011)
- Immunoglobulin A (IgA) – Immune function
- Alpha-Amylase (AA) - response of sympathetic nervous system to stressors
- Cortisol - Stress response

Research Question

- Should salivary data be included in athlete load monitoring for Paralympic athletes?
- How sensitive are salivary biomarkers to changes in training load?
- Would performance in major competition increase stress response as measured by salivary biomarkers?

Paralympics IRELAND

UNIVERSITY of LIMERICK
OLLSCOIL LUIMNIGH

SPORT IRELAND INSTITUTE

Methods

- 4 swimmers representing Ireland at 2016 Paralympic Games
- Swimmer classes - S5, S6, S8 and S9
- 4 training phases – baseline training , intensified training, taper and competition
- Bi-weekly samples during training and daily samples during 10-day competition

Paralympics IRELAND

UNIVERSITY of LIMERICK
OLLSCOIL LUIMNIGH

SPORT IRELAND INSTITUTE

Methods

- Training load quantified using session-RPE at all training sessions
- Session-RPE was previously validated in this group
- Training diary to record all training sessions
- Saliva samples analysed for IgA, AA and cortisol using IPRO point of care

Paralympics IRELAND

UNIVERSITY of LIMERICK
OLLSCOIL LUIMNIGH

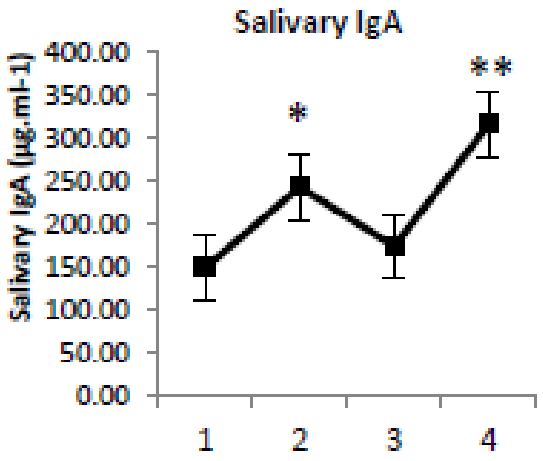
SPORT IRELAND INSTITUTE

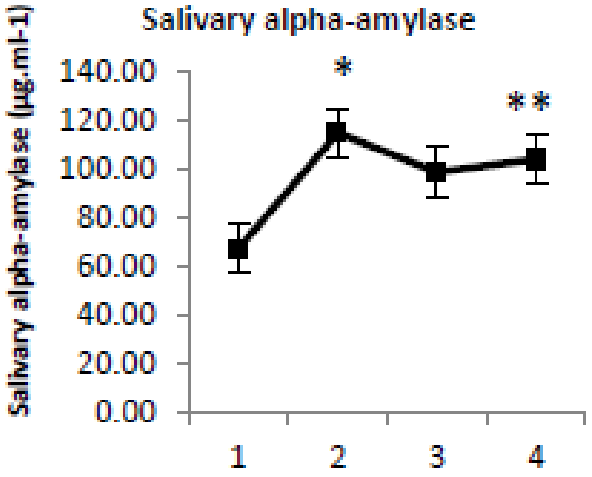
Salivary collection – IPRO

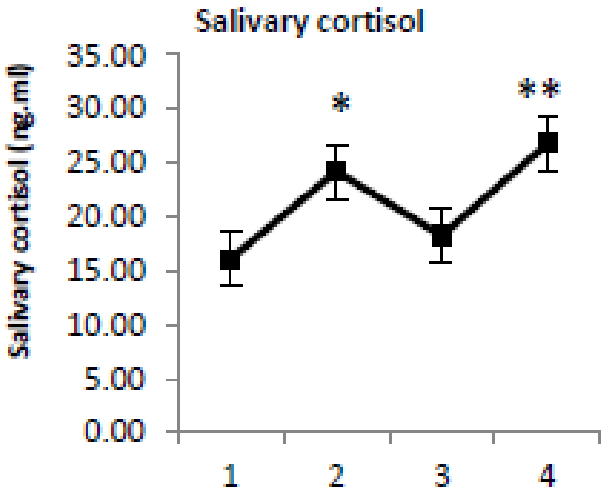
- Sampling collection time on average 20-30s
- Volume indicator colour change when complete
- Instant results when analysed (10-15min)

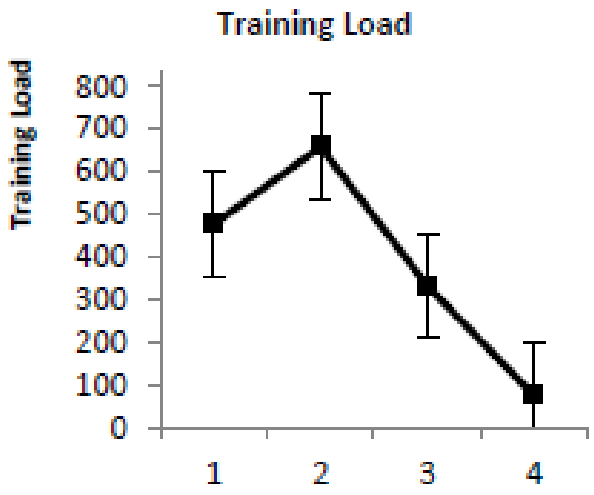
Results

- Intense training phase saw 38% increase in TL compared to baseline training
- Concurrent significant increase in sIgA, AA and cortisol
- During taper phase decrease in TL correlated with decrease in three salivary biomarkers but still above baseline levels









Paralympics IRELAND

UNIVERSITY of LIMERICK
OLLSCOIL LUIMNIGH

SPORT IRELAND INSTITUTE

Results

- Despite further reduction in TL during competition significant increases seen in all three salivary biomarkers
- Levels were significantly higher than baseline levels and intense training phase levels
- Psychological stress response having physiological impact
- Within athlete analysis showed highly significant changes supporting sensitivity of salivary measures

	Salivary IgA		Salivary AA		Salivary Cortisol	
Fixed explanatory variables						
Parameter	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error
Constant (a)	148.2	18.75	69.13	18.09	16.29	1.64
Intensified Training (△a)	94.98	27.67	45.88	19.07	7.92	2.17
Taper (△a)	25.58	31.62	29.73	21.79	1.97	2.48
Competition (△a)	168.7	24.19	35.87	16.67	10.49	1.89
Random Variables						
Level 2 (between athletes)						
Variance	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error
	220.3	430.9	745.63	653.91	3.47	4.14
Level 1 (within athletes)						
Variance	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error
	11253.38	1497.1	5341.12	710.64	69.08	9.19

Paralympics IRELAND

UNIVERSITY of LIMERICK
OLLSCOIL LUIMNIGH

SPORT IRELAND INSTITUTE

Practical applications

- Results from this study has demonstrated sensitivity of salivary biomarkers as one tool in athlete monitoring
- quantified impact of stress response during major competition in Paralympic swimmers
- Despite training load decreasing, coaches and support staff must consider the psychophysiological stress response during competition
- Recovery protocols may require adjusting as competition progresses to ensure continued optimal performance

THANK YOU

csoconnor@instituteofsport.ie
@ciara__soc

Paralympics IRELAND

UNIVERSITY of LIMERICK
OLLSCOIL LUIMNIGH

SPORT IRELAND INSTITUTE