

Innovative return to play strategies

Establishing innovative and valid performance metrics and real-time analytics. Creating big data analytics for performance optimization and injury reduction etc.

Developing innovations to support competition best practice

Mechanistic underpinnings of optimal performance

Dr. Brett Smith
Technology & Innovation

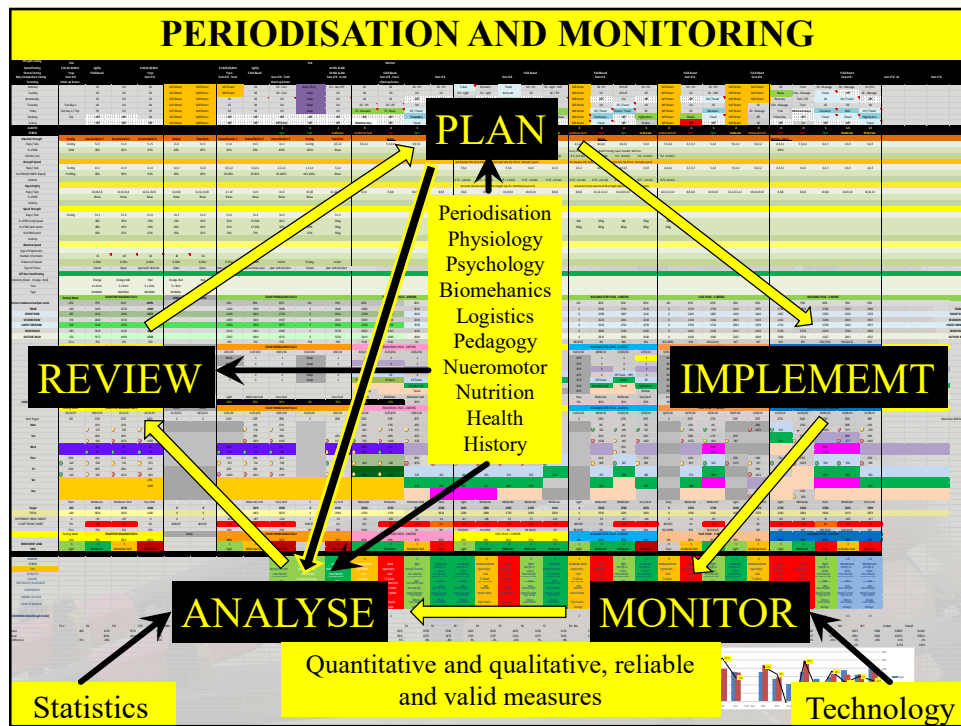
Integrating science, engineering and technology to optimize elite performance

Innovative analytics to inform effective training

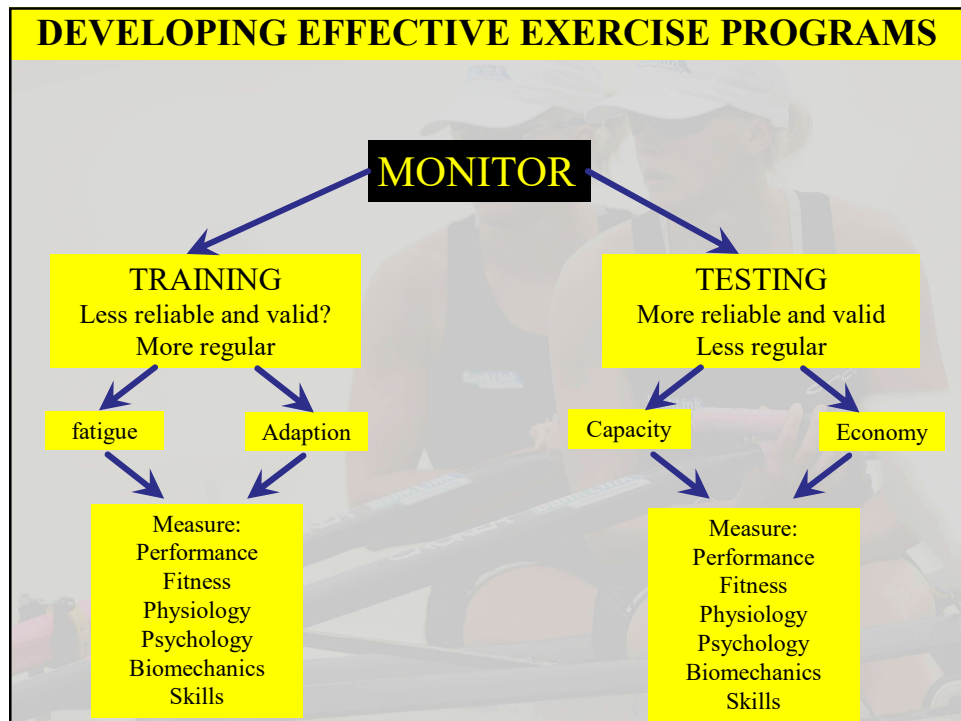
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	The Annual Plan									
Macrocycle Phases of training	Preparatory				Competitive				Transition	
Macrocycle Sub phases of training	General Preparation		Specific Preparation		Pre-Competitive		Competitive		Transition	
Meso-Cycles Establish primary and secondary conditioning goals	Non-specific aerobic base Hypertrophy	Non-specific & specific aerobic base Hypertrophy non-specific power	Specific aerobic base Strength non-specific power	Aerobic base aerobic intensity Strength transition power	Aerobic intensity Anaerobic Fartlek Specific power	Anaerobic lactic Tolerance Specific Power	Anerobic lactic Production Power maintenance	Taper & Race	Healthy activity Rehabilitation and bulletproofing	
Micro-cycles										

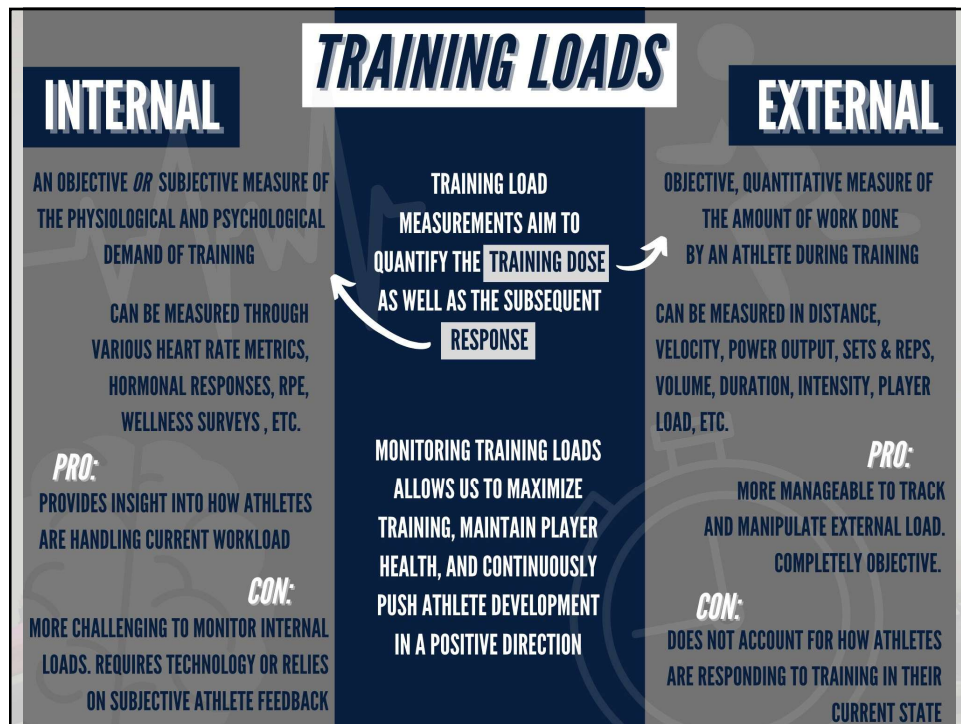
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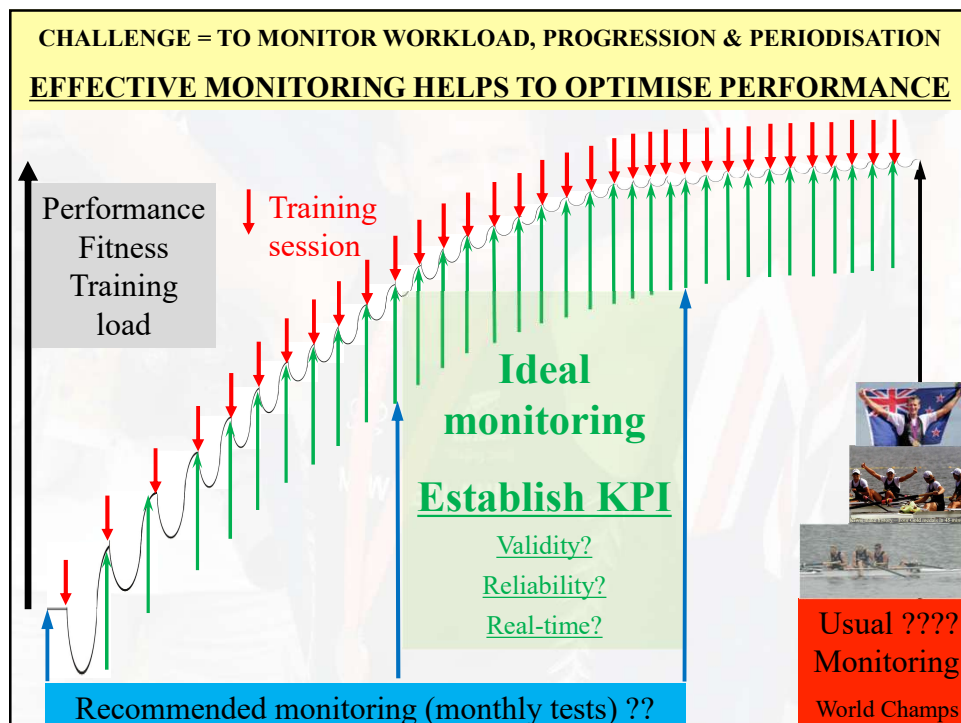
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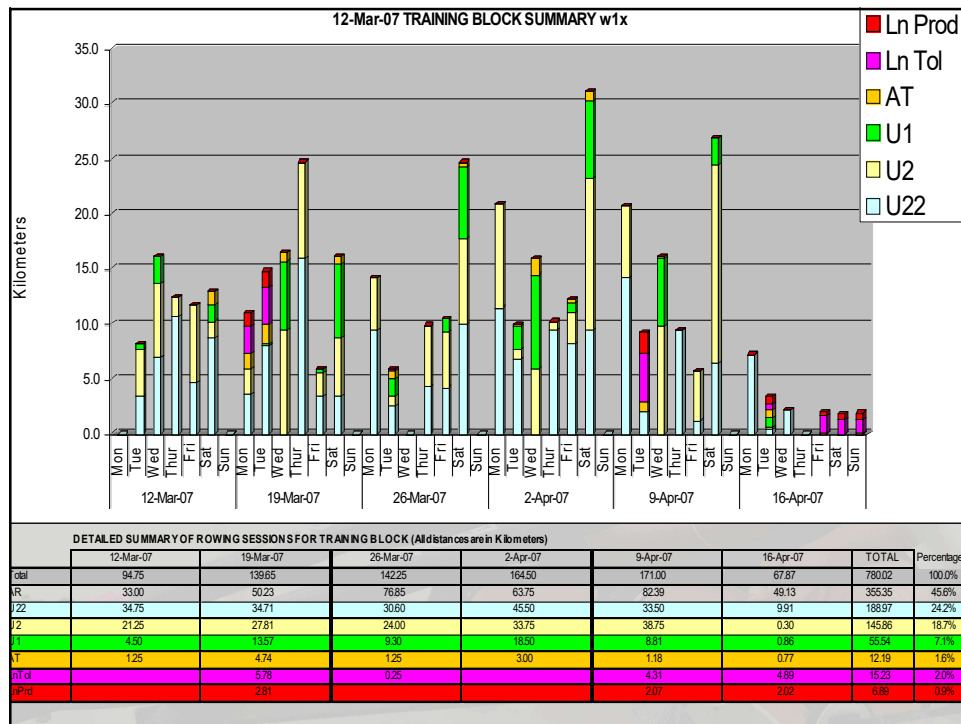
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Monitoring

- Philosophy:
 - Prognostic model (e.g., world best standards)
 - Athlete specific model (e.g., athlete's physiological capacity)
- Accurate KPI metrics
- Specific performance metrics
 - Boat speed
 - Athlete power (force, work, velocity, acceleration)
- Opportunities
 - Specific monitoring of training
 - Endurance
 - More than just monthly lab testing
 - Power
 - More than just monthly gym testing
 - Flexibility, physiology, etc
- Effective analytics and reporting



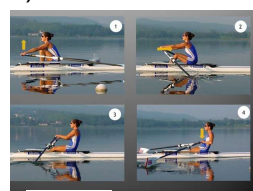
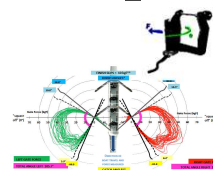
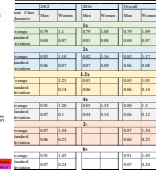
The University of Waikato
Te Whare Wānanga o Waikato

REVIEW ARTICLE

Measures of Rowing Performance

T. Brett Smith¹ and Will G. Hopkins²

¹ Department of Sport & Leisure Studies, University of Waikato, Hamilton, New Zealand
² Sport Performance Research Institute NZ, AUT University, Auckland, New Zealand

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RUGBY (different approach to rowing)

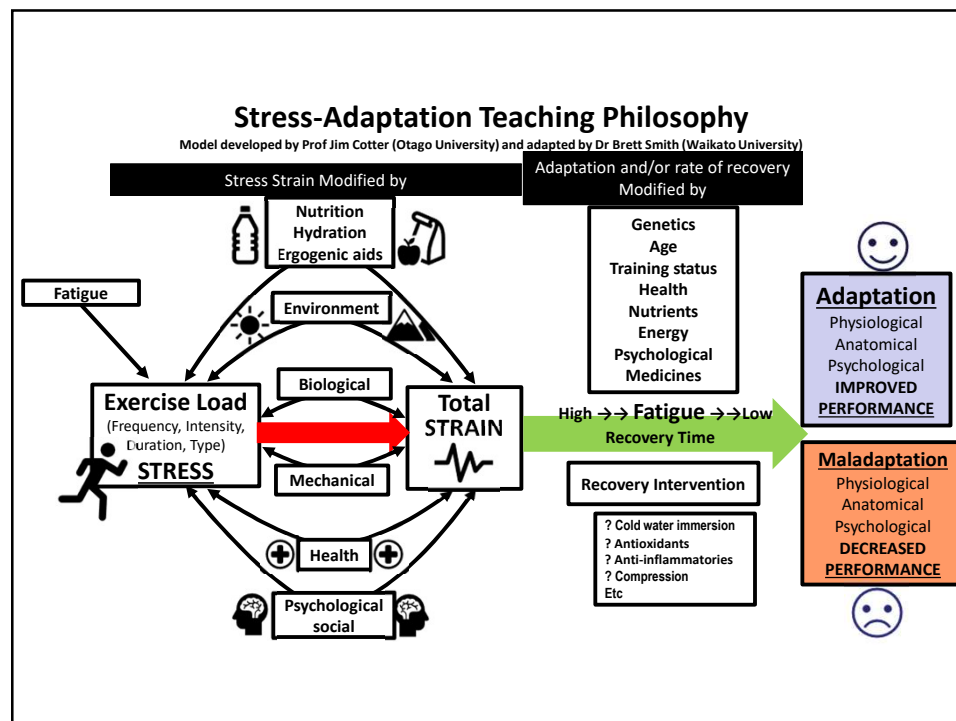
“PREPARING FOR WAR”

Required conditioning vs optimal conditioning
recovery focus vs survival focus

MATCH SPECIFIC, QUALITY & WORST-CASE SCENARIO
WELLNESS & INJURY MANAGEMENT



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Internal Monitoring (measures of stress/strain/recovery)

Morning wellness provides insight into recovery from previous day/s



Adapted McLean Questionnaire

Fatigue					
	Always Tired	Slightly Tired	Normal	Fresh	Very Fresh
Sleep Quality					
	Insomnia	Restless Sleep	Difficulty Falling Asleep	Good	Very Restful
General Muscle					
	Very Sore	Increase in Soreness	Normal	Feeling Good	Feeling Great
Stress Levels					
	Highly Stressed	Feeling Stressed	Normal	Relaxed	Very Relaxed
Mood					
	Highly Annoyed / Irritable / Down	Snappiness At People	Less Interested In Other Activities Than Normal	A Generally Good Mood	Very Positive Mood
Health					
	Very Sick	Slight Symptoms of Illness	Optimal Health		
Weight: 96		KG	<button>Save</button>		

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Internal Monitoring (measures of stress/strain/recovery)

Morning wellness provides insight into recovery from previous day/s

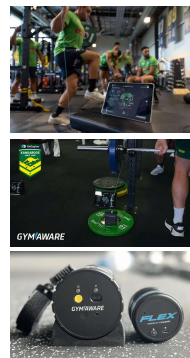
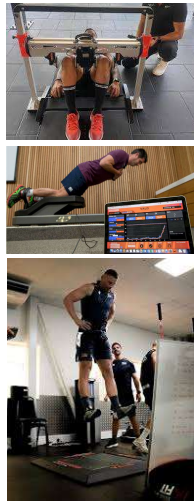
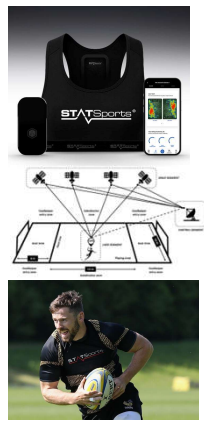
Restrict Metrics: [Show All](#) [Weight](#) [Fatigue](#) [Sleep](#) [Muscle](#) [Stress](#) [Mood](#) [Health](#) [Hide Squads/Status](#) [Hide Position](#) [Hide No Wellness](#)

Show 50 entries

First Name	Last Name	Position	Squad status	Fatigue	Muscle	Health	Target(m)	Cumul Target	Status	Capacity	Training status	Notes
		Inside Backs	Player	3	3	2	781	611	F	robust	ok	URT1
		Inside Backs	Player				781		F	careful	no training	
		Outside Backs	Player				817		F		no training	
		Inside Backs	Player	3	3	5	898	-59	F	robust	monitor	
		Loose Forwards	Player	3	3	5	710	1008	F	robust	monitor	
		Midfield Backs	Player	4	3	5	781	216	F	robust	ok	
		Loose Forwards	Player	2	2	5	639	493	F	robust	ok	UB extras
		Inside Backs	Player				781		F		no training	
		Outside Backs	Player	2	2	5	817	1102	F	fragile	monitor	HML
		Midfield Backs	Player	4	4	5	547	1964	N	robust		
		Loose Forwards	Player	4	4	5	710	1252	R	fragile		
		Second Row	Player	4	4	5	490	72	N	careful	modified	Units Only
		Outside Backs	Player	3	4	5	817	-72	F	robust	ok	
		Inside Backs	Player	3	3	5	820	255	F	careful	monitor	
		Loose Forwards	Player	3	4	5	710	283	F	careful	ok	
		Front Row	Player				471	323	F	careful	ok	
		Front Row	Player	2	2	5	388	70	F	careful	ok	UB & T spine from scrum. Treat
		Front Row	Player	2	3	5	443	164	F	careful	ok	
		Loose Forwards	Player				710		R		no training	
		Midfield Backs	Player	3	3	5	781	212	F	careful	monitor	HML
		Loose Forwards	Player	2	2	5	710	671	F	fragile	monitor	Back + Treat

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External monitoring

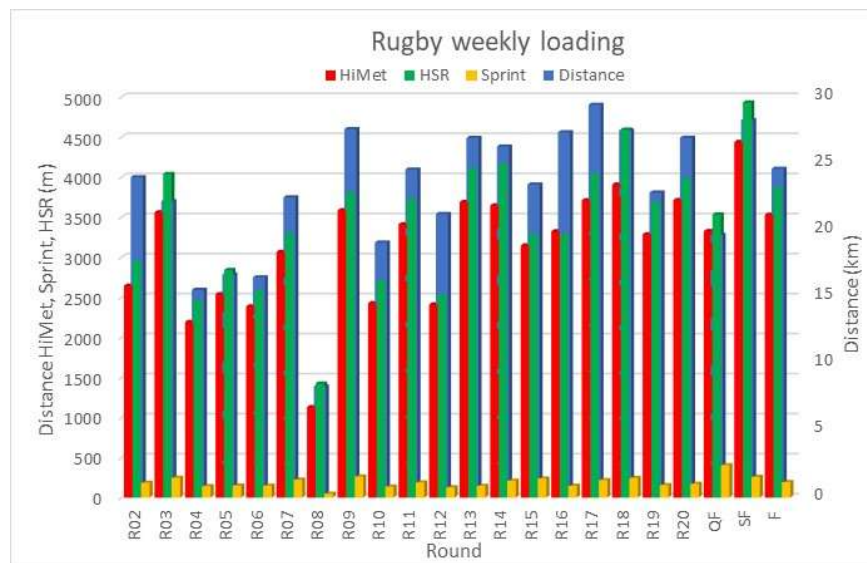


VALD PERFORMANCE
FORCEFRAME
STRENGTH TESTING SYSTEM
Repeatable, adaptable, integrated training and testing for every major joint in the body.

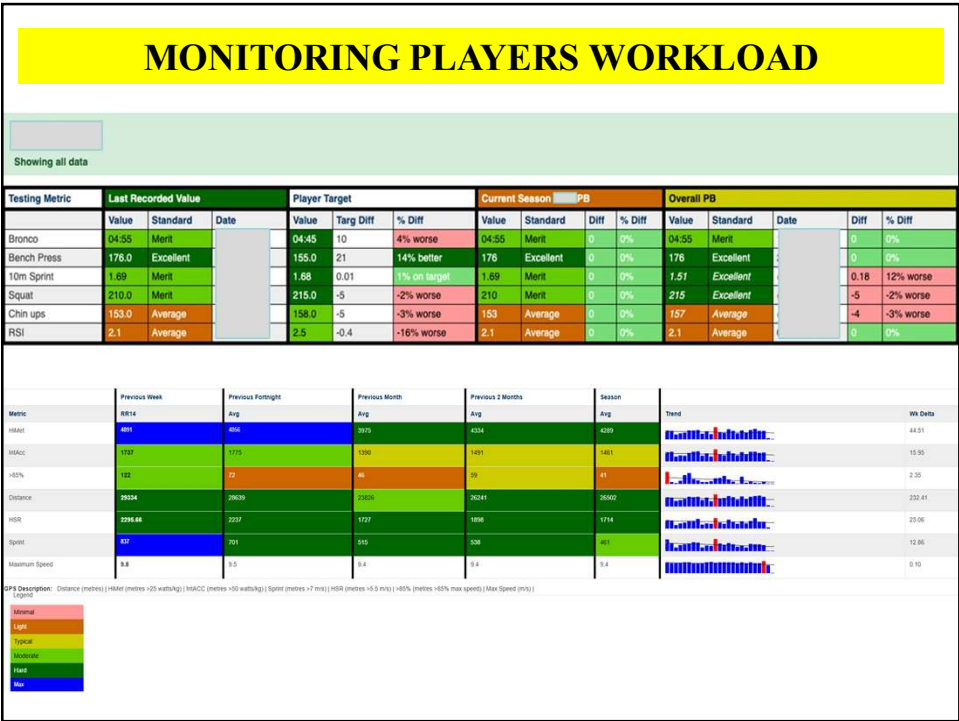


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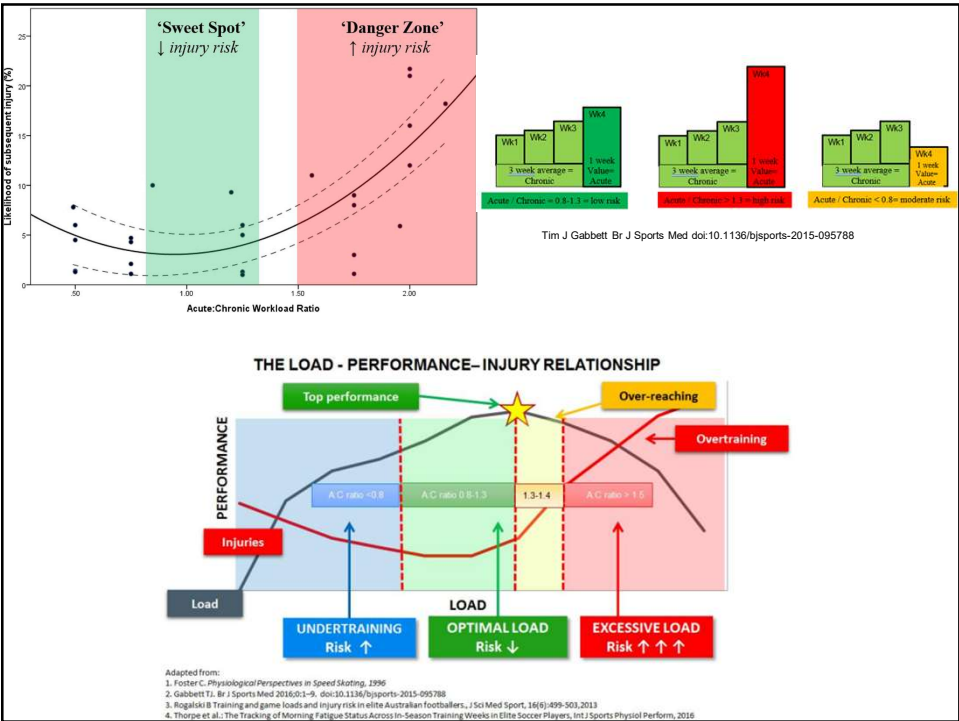
MONITORING TEAM WORKLOAD



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Mesocycle periodization

		OFF-SEASON MESOCYCLE				PRE-SEASON MESOCYCLE 1				PRE-SEASON MESOCYCLE 2			
Max	5200												
	5000												
	4800												
	4600												
	4400												
Very Hard	4200												
	4000												
	3800												
Hard	3600												
	3400												
Moderate	3200												
	3000												
Light	2800												
	2600												
Very light	2400												
	2200												
Minimal	2000												
	1800												
	1600												
	1400												
	1200												
	1000												
	800												
	600												
	400												
	200												
Week		1	2	3	4	5	6	7	8	9	10	11	12
Targets		1500	2000	2600	3200	1400	2800	3000	3400	2600	3600	4000	4200

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Individualized weekly target and safety setting



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INDIVIDUAL ATHLETE MONITORING

Analysis Tool

Week Report. Wk values are coloured by position based weekly standards - see end of report for more detail

SpMet = Dist > 50 w/kg (3 m/s/s or 10.6 m/s) HiVel = Dist > 85% max speed. 1 wk one week value. 4 wk = average over last month
Target Diff = % difference from weekly target (or 4 week targets). % risk = % of week > 1.5 Acute to Chronic.
Wk Delta = linearised weekly change across season i.e. theoretically the trend of the per week change (positively or negatively) across the season so far

Team Target Analysis Report	Shirt	HiMet							SpMet							HiVel						
		1wk	Targ Diff	4wk	% Risk	Targ Diff	Trend	Wk Delta	1wk	Targ Diff	4wk	% Risk	Targ Diff	Trend	Wk Delta	1wk	Targ Diff	4wk	% Risk	Targ Diff	Trend	Wk Delta
	1Prop	2842	87%	1871	0%	80%		278.90	357	50%	363	0%	63%		42.90	34	131%	48	25%	230%		-2.80
	1Prop	2660	100%	2250	25%	97%		378.00	477	76%	437	0%	76%		80.00	34	131%	52	75%	200%		2.70
	1Prop	2456	92%	2317	100%	100%		278.00	710	117%	682	100%	100%		57.00	86	531%	47	50%	235%		78.00
	1Prop	2170	82%	1845	25%	95%		389.00	682	90%	551	50%	98%		110.00	9	35%	18	25%	80%		1.40
	1Prop	2317	87%	2235	25%	98%		365.90	565	83%	535	50%	94%		77.40	47	181%	29	50%	149%		11.10
	1Prop	2616	99%	2295	25%	99%		412.70	639	105%	574	25%	100%		100.20	94	352%	55	100%	275%		23.60
	1Prop	1274	48%	1875	25%	80%		144.40	326	54%	455	50%	80%		39.20	21	81%	19	33%	70%		-5.50
	1Prop	59	6%	497	0%	32%		-188.40	1	0%	113	0%	20%		-45.10	-0	0%	NAN	na	na		NaN
	1Prop	2782	102%	2368	25%	103%		418.80	820	135%	728	50%	127%		128.00	123	473%	74	75%	370%		24.70
	2Hooker	2304	100%	2536	25%	100%		449.40	563	80%	535	25%	81%		77.70	12	31%	11	25%	38%		0.00
	2Hooker	2549	113%	2591	25%	82%		241.60	729	103%	649	25%	98%		70.70	1	3%	31	50%	14%		-59.00
	2Hooker	2144	86%	1768	33%	72%		591.00	593	84%	507	33%	74%		162.50	-0	0%	2	0%	11%		NaN
	2Hooker	2538	88%	2514	25%	99%		384.60	584	83%	508	50%	91%		85.60	9	23%	5	0%	21%		0.50
	3Lock	1390	44%	2339	25%	85%		150.10	406	57%	658	75%	90%		61.20	-0	0%	35	67%	130%		16.50

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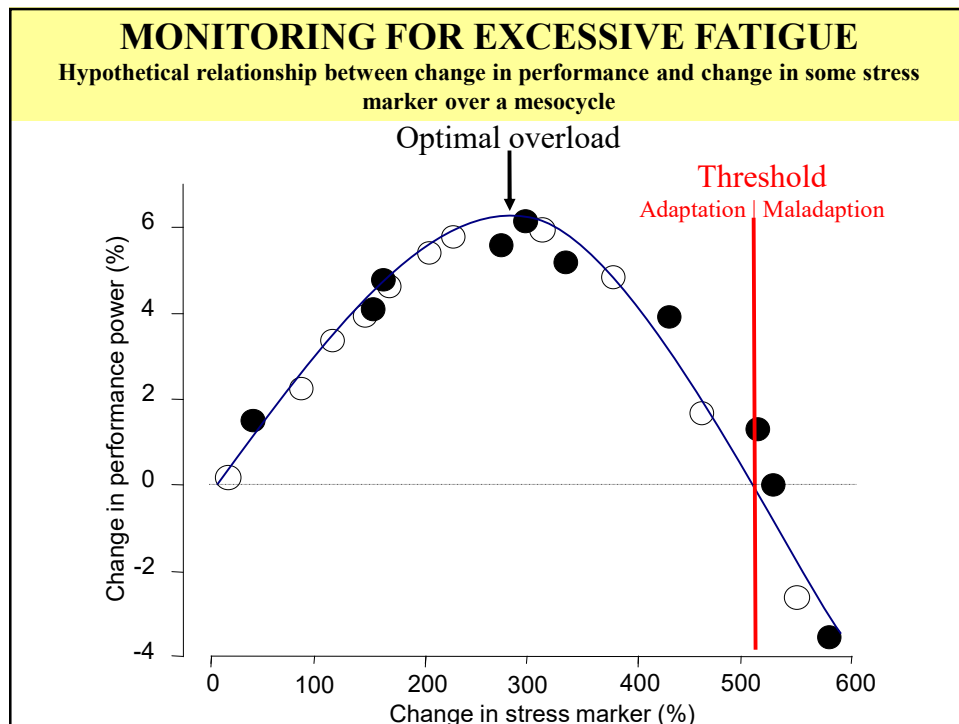
MONITORING QUALITY WORKLOAD

Concise Day Report:

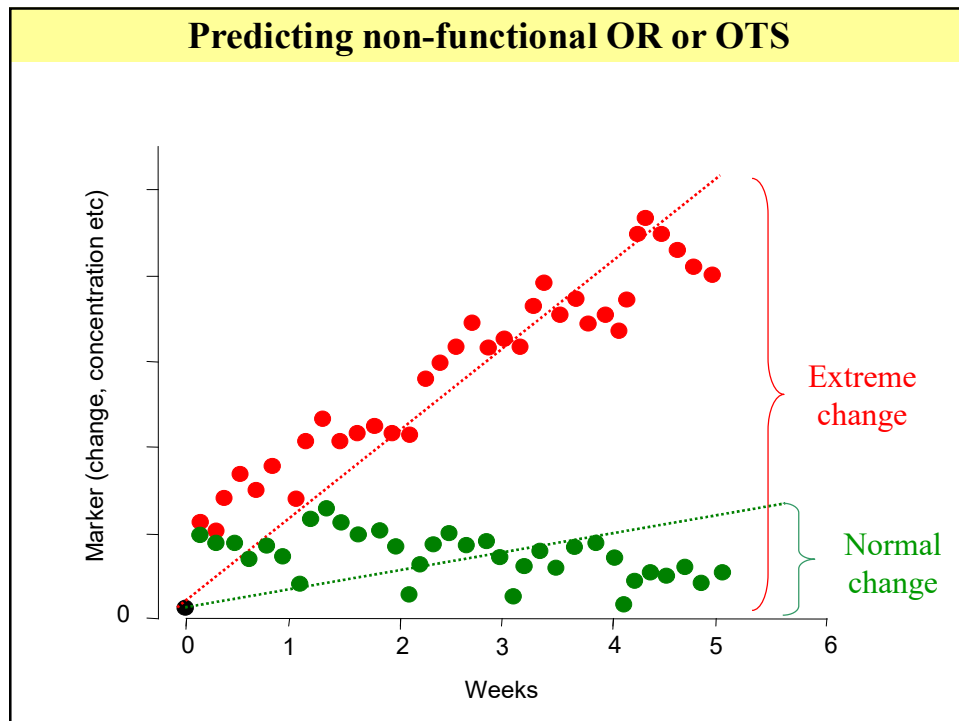
KEY POINTS

Name	Position	Fit	Quality			HiMets		Int Accel		>85% Max		Max Speed		Distance	
			Mins	%Min	%Drill	Metres	Rnk	Metres	Rnk	Metres	Rnk	m/s	%PB	Metres	Rnk
	1Prop	FFFF	00:33:54	70%	65%	2792	1	820	1	123	1	8.5	100%	20843	3
	1Prop	FFFF	00:32:51	68%	60%	2660	2	477	6	34	5	7.7	96%	22601	1
	1Prop	FFFF	00:34:32	74%	68%	2616	3	638	3	94	2	7.6	98%	20561	4
	1Prop	FFFF	00:29:27	53%	51%	2456	4	710	2	86	3	8.6	101%	21581	2
	1Prop	FFFF	00:24:39	53%	45%	2317	5	565	5	47	4	7.3	94%	19169	6
	1Prop	NNN	00:27:54	74%	69%	2170	6	602	4	9	8	7	89%	16706	7
	1Prop	FFFF	00:28:55	62%	53%	2042	7	357	7	34	6	7.2	92%	19862	5
	1Prop	FF	00:18:29	45%	31%	1274	8	326	8	21	7	8.2	98%	9686	8
	1Prop	FF				59	9	1	9	-0	9	5.1	64%	2958	9
	2Hooker	FFFF	00:21:00	43%	30%	2904	1	563	4	12	1	7.4	88%	21094	1
	2Hooker	FFFF	00:28:37	58%	50%	2549	2	725	1	1	3	7.5	87%	19963	2
	2Hooker	FFF	00:28:26	65%	63%	2538	3	584	3	9	2	7.5	88%	17447	3
	2Hooker	FFF	00:28:33	59%	50%	2144	4	583	2	-0	4	7.8	82%	15733	4
	3Lock	FFFF	00:41:18	78%	72%	3423	1	820	2	68	1	7.9	94%	22545	2
	3Lock	FFFF	00:32:48	62%	59%	3151	2	834	1	0	3	7.5	82%	21469	3
	3Lock	FFFF	00:38:34	73%	68%	2786	3	760	3	15	2	7.8	90%	22591	1
	3Lock	FF	00:22:18	54%	44%	1390	4	480	4	-0	4	6.8	76%	11115	4
	4Loose	FFFF	00:34:48	66%	59%	3460	1	1020	2	39	5	8.1	90%	24278	1
	4Loose	FFFF	00:27:51	53%	50%	3411	2	994	3	83	1	9.2	96%	21925	3
	4Loose	FFFF	00:24:36	47%	38%	3334	3	915	4	72	4	8.1	94%	20989	5
	4Loose	FFFF	00:20:43	58%	50%	3018	4	821	5	78	2	8.2	94%	20357	6
	4Loose	FFFF	00:33:23	63%	55%	2982	5	1034	1	74	3	8.9	98%	21051	4
	4Loose	NNNN	00:32:52	63%	55%	2924	6	765	6	38	6	7.6	89%	22486	2
	5Inside	FFFF	00:29:08	53%	60%	4345	1	884	6	42	3	8.1	92%	20910	1
	5Inside	FFFF	00:23:01	44%	50%	4026	2	1206	2	34	4	8.2	90%	20591	2
	5Inside	NNNN	00:23:37	49%	50%	3975	3	948	5	72	2	8.7	97%	24469	4
	5Inside	FFFF	00:05:28	11%	19%	3964	4	1055	4	72	1	8.3	92%	22830	6
	5Inside	NNNN	00:17:52	34%	36%	3958	5	1117	3	2	6	8.2	87%	24352	5
	5Inside	FFFF	00:16:38	34%	30%	3938	6	1233	1	22	5	8.9	92%	24529	3
	5Inside	FFFF	00:06:11	19%	20%	2761	7	545	7	2	7	7.9	88%	17168	2
	6Midfield	FFFF	00:17:45	36%	40%	4019	1	1383	1	85	2	9.4	100%	23337	3
	6Midfield	NNNN	00:09:06	19%	20%	3824	2	1239	4	42	5	9.3	95%	22753	4
	6Midfield	FFFF	00:08:18	17%	15%	3604	3	1270	3	54	4	8.9	94%	22448	5
	6Midfield	FFFF	00:04:15	9%	10%	3589	4	1081	7	82	3	9.2	96%	24734	1
	6Midfield	FFFF	00:11:13	23%	30%	3563	5	1331	2	97	1	10.2	103%	23996	2
	6Midfield	FFFF	00:21:23	44%	50%	3546	6	1138	5	2	7	8.3	85%	21304	7
	6Midfield	FFFF	00:12:04	25%	30%	3524	7	1098	6	4	6	7.9	85%	21930	6
	6Midfield	NNNN	00:07:47	14%	20%	3376	8	945	8	0	8	6	82%	14948	8

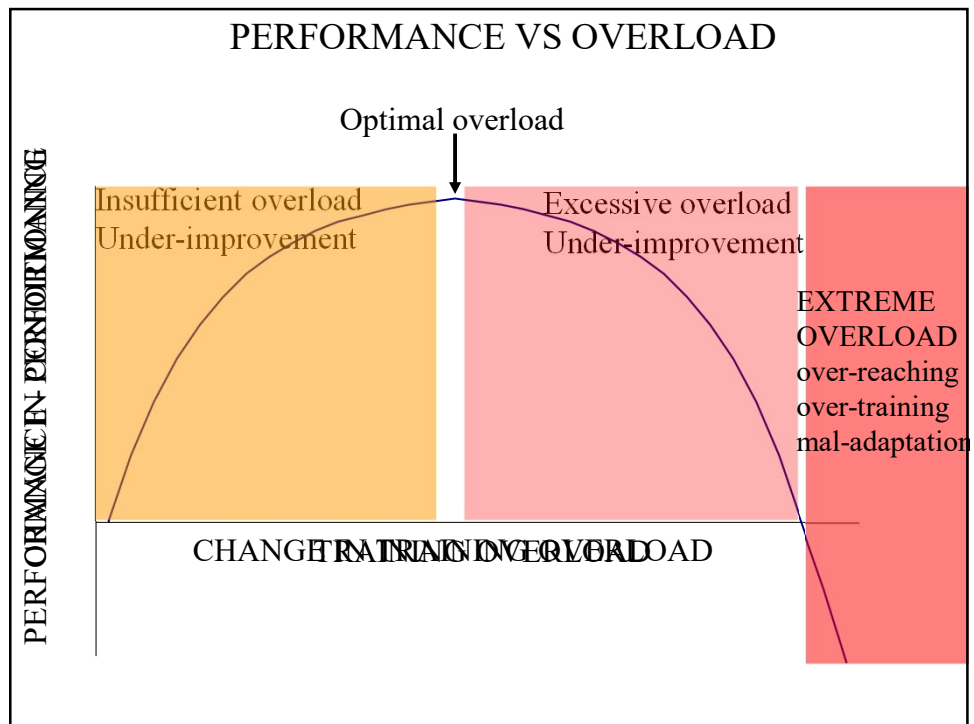
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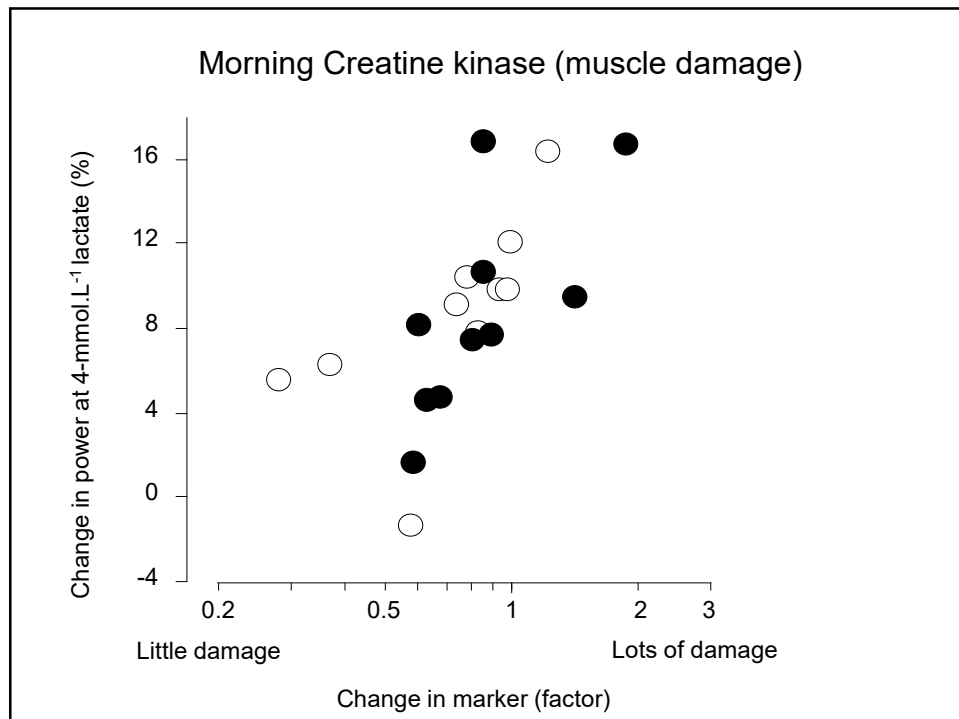
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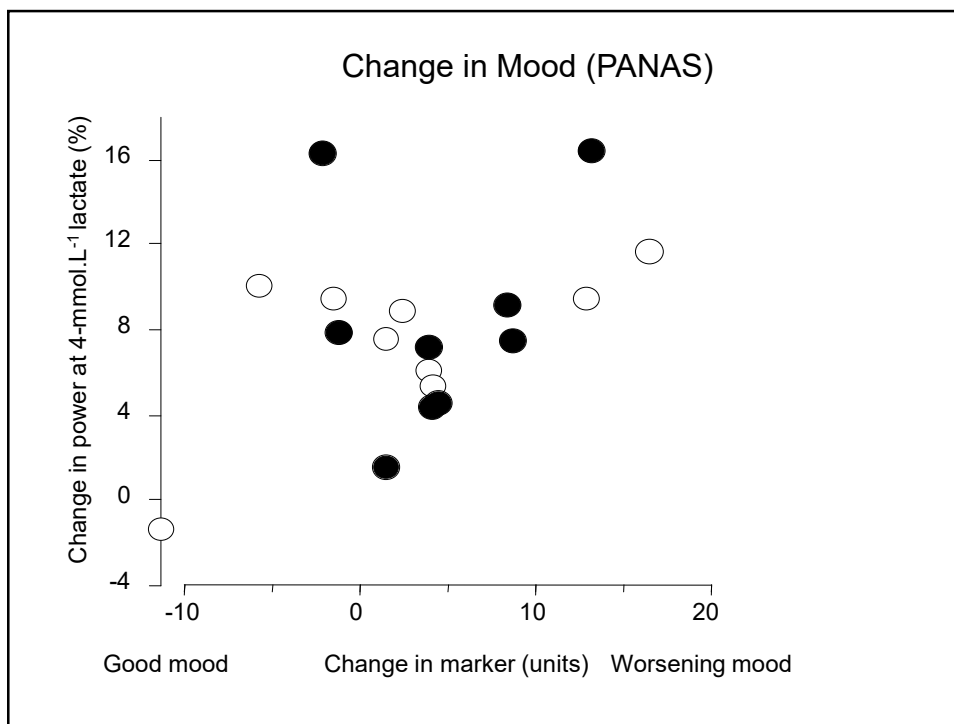
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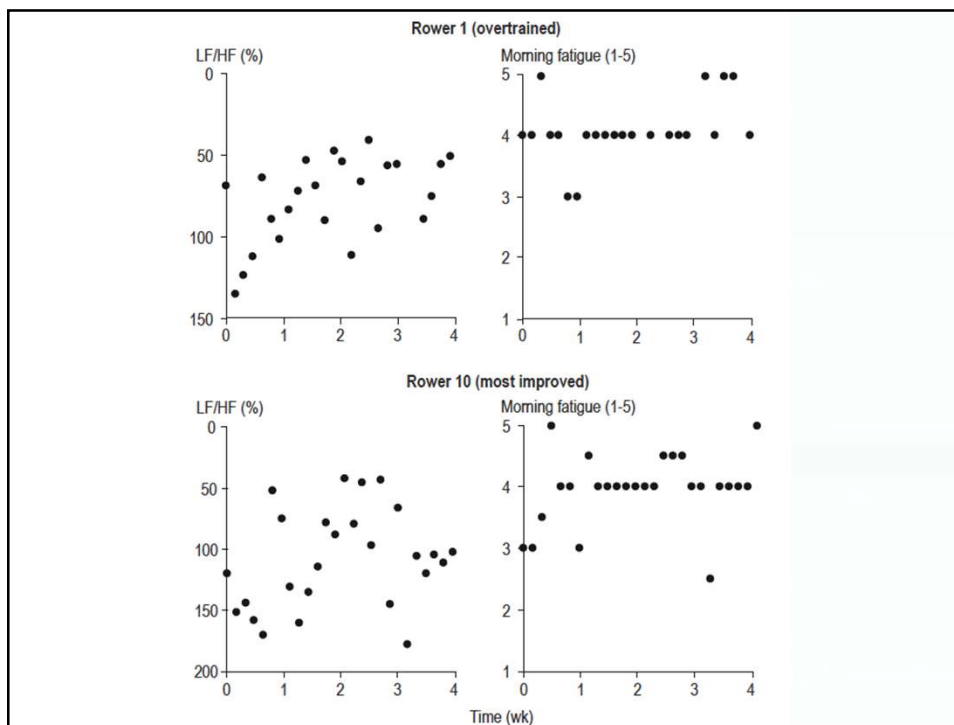
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Internal Monitoring (measures of stress/strain/recovery)

Morning wellness provides insight into recovery from previous day/s

Pope, C. C., Penney, D., & Smith, T. B. (2017). Overtraining and the complexities of coaches' decision making: Managing elite athletes on the training cusp. Reflective Practice.

In many elite sport performance contexts overtraining is a critical issue for coaches to understand, recognise and respond to. While the indicators and effects of overtraining have attracted considerable research interest, there are no diagnostic tests that reliably predict impending overtraining.

..... In doing so it recognizes that coaching involves decision-making in complex and demanding situations.

The coaches were found to monitor the fatigue of their rowers through observation, communication and measures of training pace.

In general, the intuitions and cues that were used by coaches had little in common with overtraining markers or indicators that are promoted in the sports science literature.

Coaches' decision-making was based largely on subjective information and processes that were influenced by a range of stressors unique to their positions.

Coach Tools:

- **Training intensity and duration**
- **Body language**
- **Change in technique**
- **Communication**
- **Athlete behaviour**