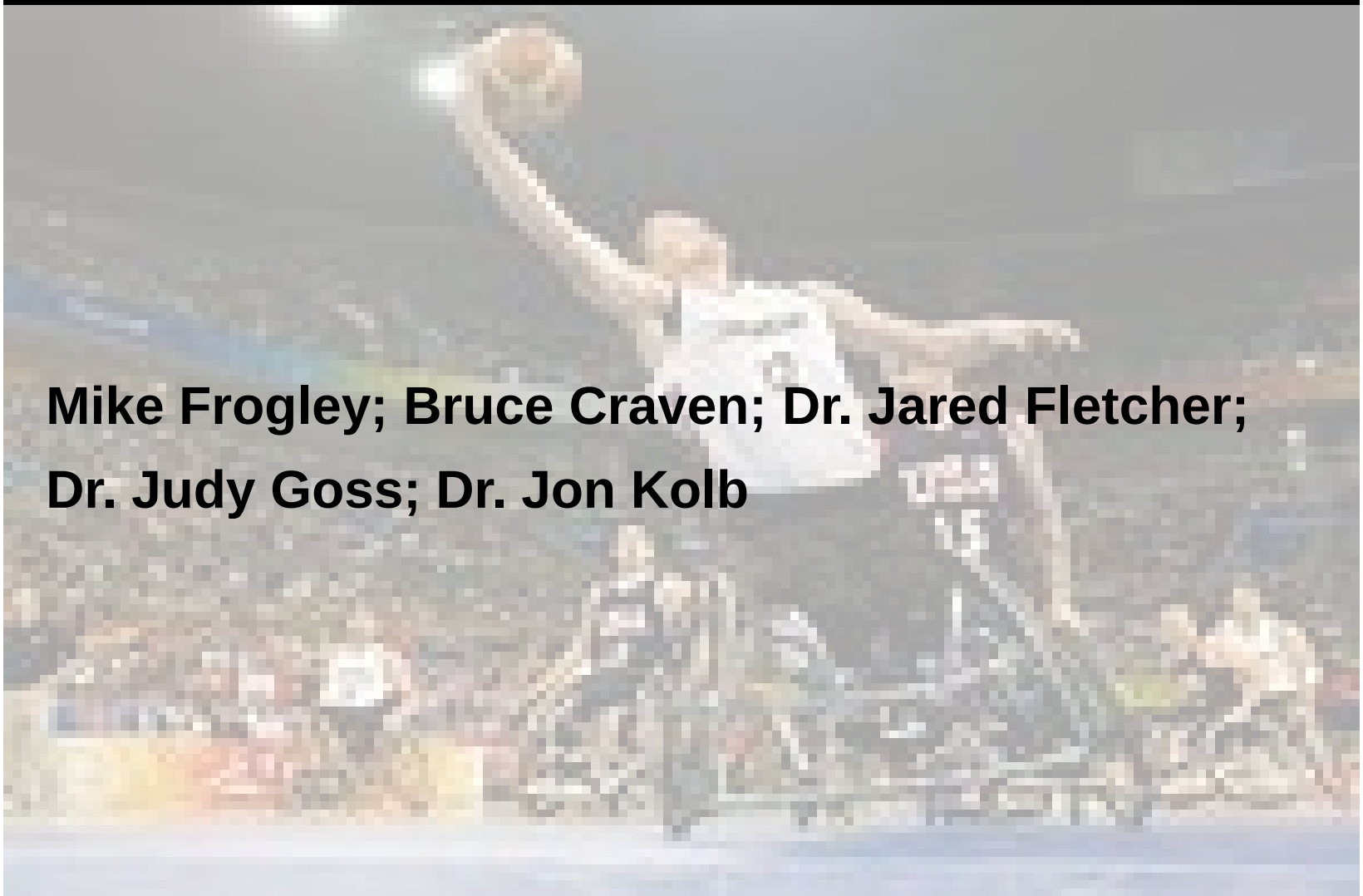
Canadian model for supporting the Paralympic Coach in the daily training environment



Mike Frogley; Bruce Craven; Dr. Jared Fletcher; Dr. Judy Goss; Dr. Jon Kolb

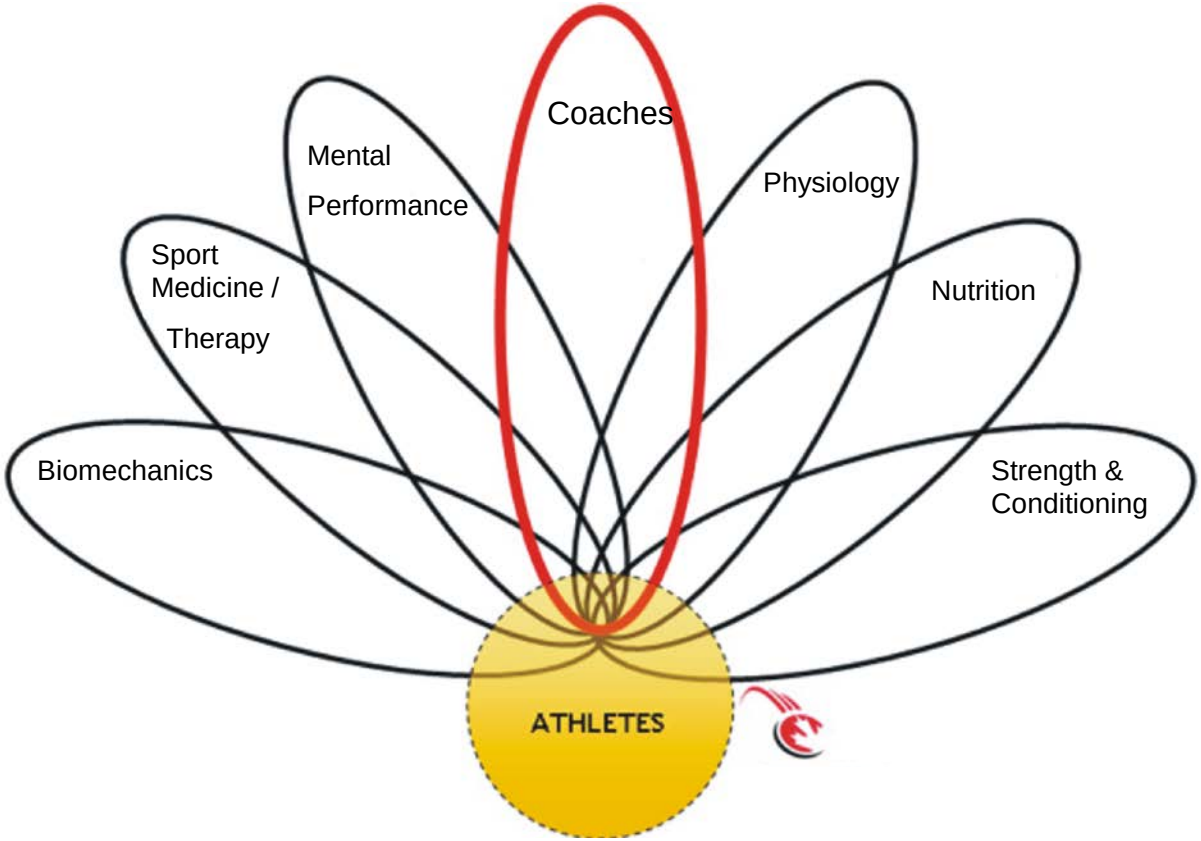
Canadian model for supporting the Paralympic Coach in the daily training environment

Performance Enhancement Team (PET)

↓

Integrated Support Team (IST)

Integrated Support Team (IST)



CANADIAN SPORT INSTITUTE

INSTITUT CANADIEN DU SPORT

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Montréal

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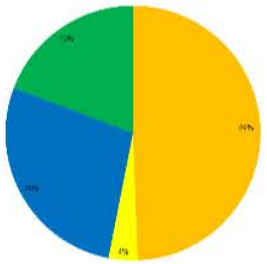


Vision

Canadian Sport Institutes Network is a key contributor to Canada's world leading Olympic and Paralympic podium performances.

Mission

To provide a world-class, multi-sport daily training environment for athletes and coaches through expert leadership, services and programs.

Values

Excellence – Leadership – Innovation – Integrity – Partnership

Purpose of the IST

- Work with the Coach and Technical Leadership
- Integrate the most effective Sport Science & Sports Medicine into the periodized framework of the Yearly Training Plan
- Training, Competition, Recovery, Rehabilitation
- Adjust to the quadrennial plan leading to the Paralympic Games.

Goal of the Integrated Support Team

To have healthy, fit athletes with a solid psychological platform, on the starting line.

Where do our Paralympic Athletes come from…

- Congenital vs Acquired
- Accidental vs Planned
- Stable vs Progressive

What are your Goals?

Shauna Ryan
2008 Paralympics in Goalball
2016 Paralympics in Cycling

Athlete Development

An athlete's adaptation bears the imprint of the type of exercise systematically used in training/treatment.

Arnold Boldt

- 1976 Paralympiad High Jump
- 2012 Paralympics Cycling

Performance Excellence

Goldsmith (2003), Groves (2011)

The ability to maintain TECHNICAL EXCELLENCE

- at SPEED
- under PRESSURE
- when FATIGUED
- with the WILL TO WIN

We are what we repeatedly do. Excellence then, *is not an act but a habit.*
- Aristotle -

Health First

- Baseline multi-discipline health assessment in collaboration and relationship to performance assessment
- Individual health status and performance status monitored based on analysis of “within subject variation” vs “between subject variation”
- Individual Health and Performance case management within the IST…development of an Individual Performance Plan (IPP)

Health First

- Health Education
  - ADL's and Sport
  - Multi-factorial aspects of stressors impacting health based on disability
    - Physical, Emotional, Environmental, Travel
- Early detection through monitoring and early intervention by appropriate provider
- Open honest communication is the key

Health First

- Health responses to training and how differ between individuals and classifications
  - Medical, Physiological, Psychological
- Bowel and Bladder (monitor and communicate change)
- Skin Conditions (monitor and communicate change)
- Changes in medications (OTC and Prescription)
- Changes in muscle tone
- Changes in nerve pain
- ADL and impact on recovery (seasonal)
  - Impact of training fatique on ADL and daily energy expenditure

Health First – Acquired Injuries

- Initial recovery from injury
- Clearance to start training … major//minor injuries
- Acceptance of changes
  - What's Lost – What's Changed – What Remains
- Classification relative to sport
  - Eligible Impairment
  - Minimum Disability Criteria
  - Technical Assessment for sport and ADL's
- Previous Training History
  - Training Loads
  - Training Adaptations

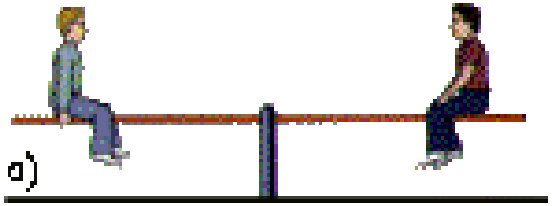
Mobility – Stability - Skill

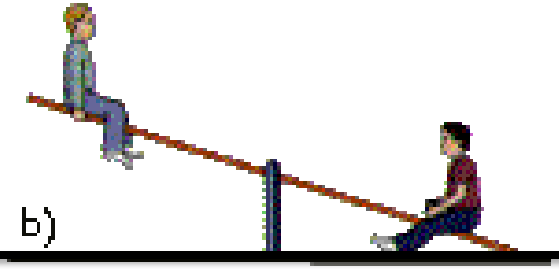
- Mobility
  - Quantity and Quality
  - Active//Passive ROM
  - Spasticity//Tone//Stiffness issues
- Stability
  - Internal stability … cortical vs brainstem control
  - External stability … bracing/rods
- Mobility on Stability
  - Changes in mobility with changes in stability (internal//external) … classification impact
- Skill
  - Development with respect to changes in mobility//stability

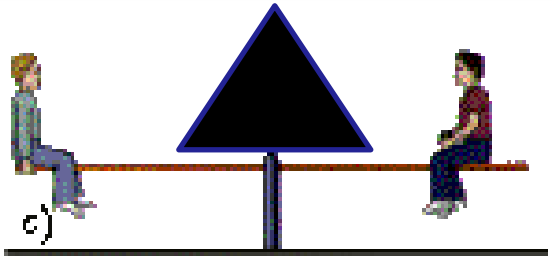
Mechanical Loading

GRAVITY

MUSCULAR FORCES







Mechanical Changes
Gravity and Muscles

- Impact of changes in muscle function
  - Changes in muscle function
  - Changes in muscle Tone of muscle function
  - Gravitational loading changes
    - Standing/Sitting posture
  - Muscle trainability with respect to cortical control versus brain stem/mid brain influence

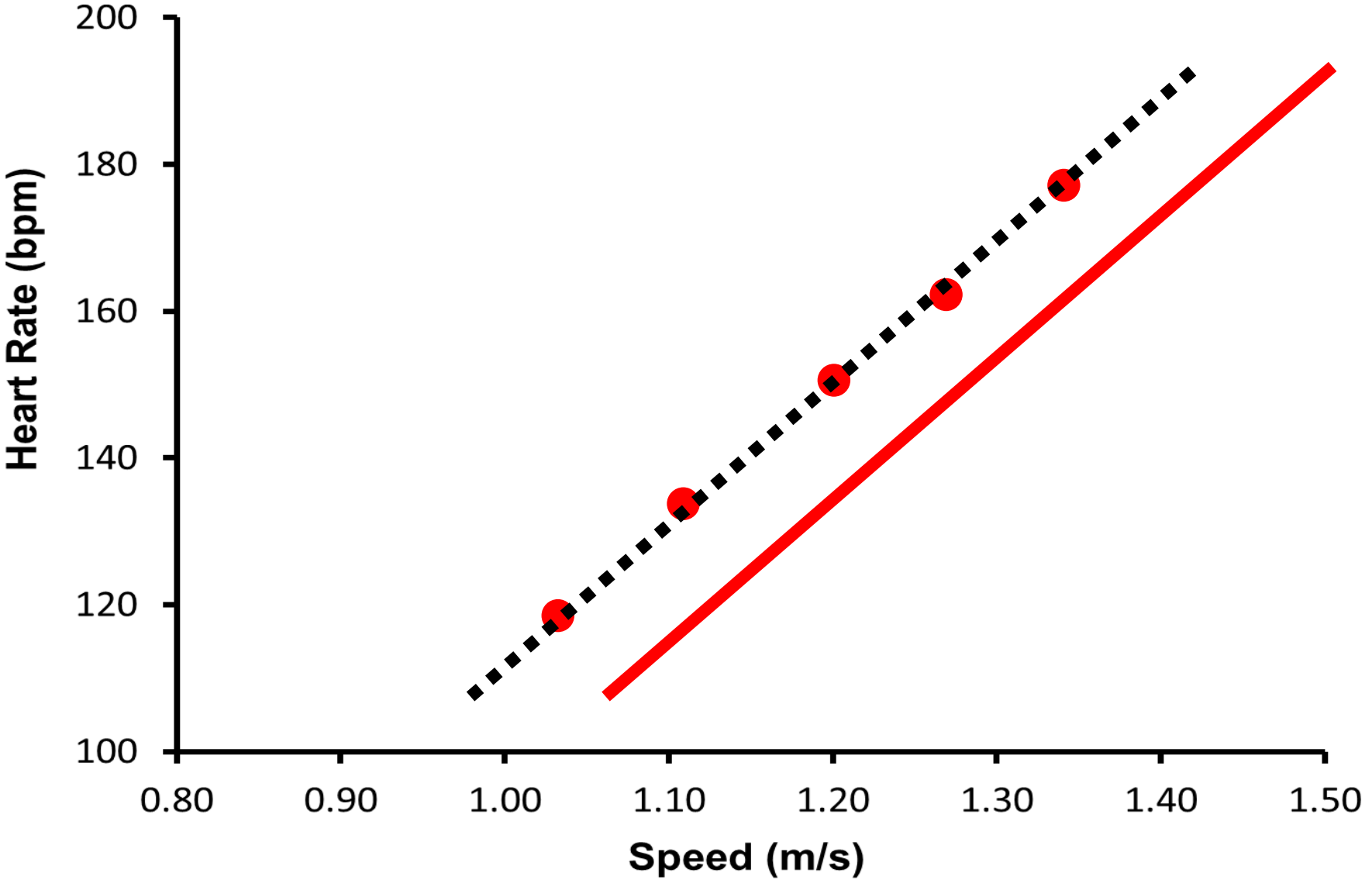
Training and Injury

- Planning for interventions and planning for impact in loading and recovery strategy
- Monitor Acute//Chronic load and recovery strategy to ensure optimal loading and monitor signs & symptoms of altered mechanical loading on tissue

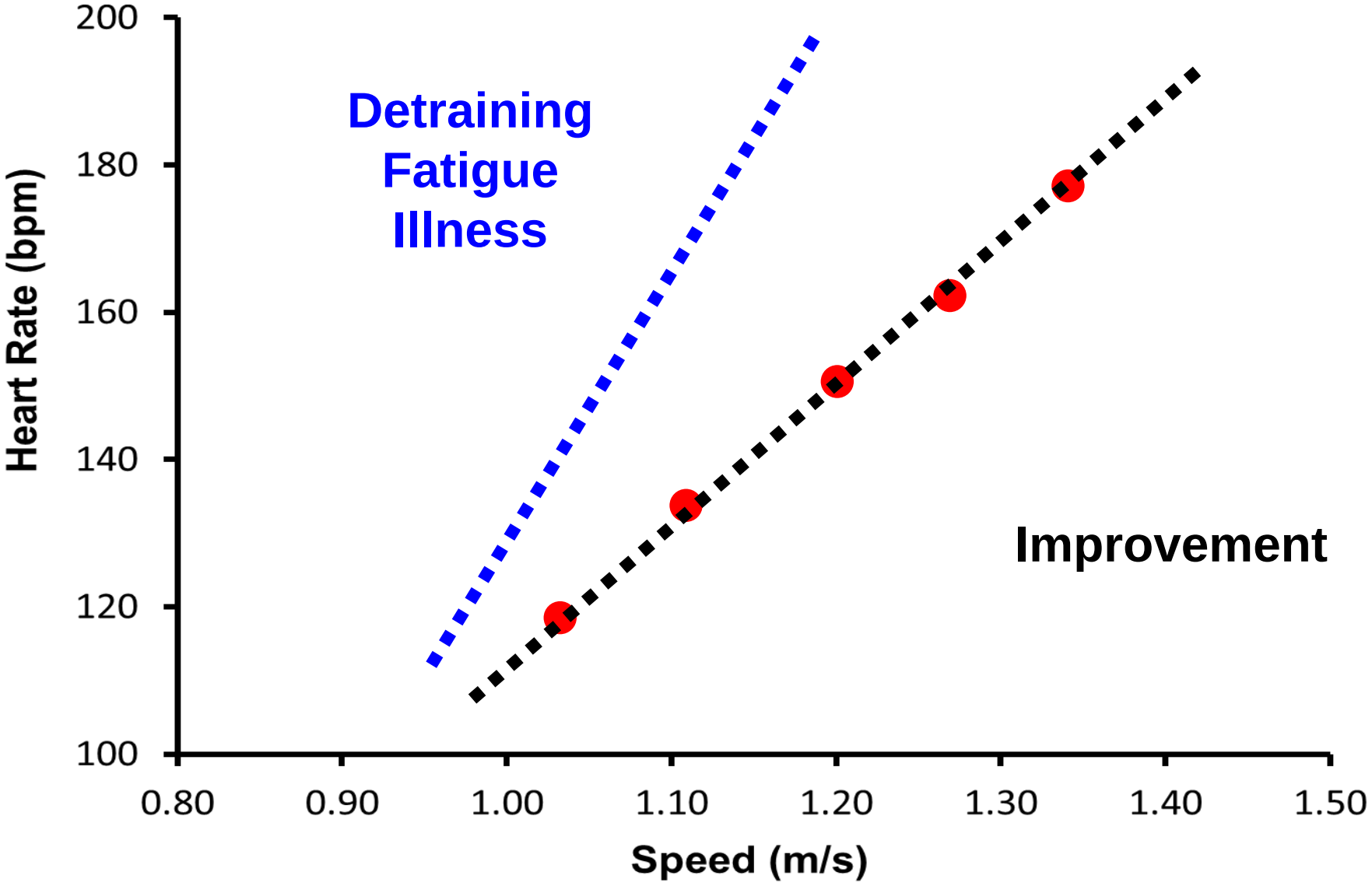
What coaches need from Sports Science *(Foster et al. IJSPP, 2017)*

1. Evaluate athlete **potential**
2. To evaluate the athlete's **current status**
3. To evaluate how the athlete is **responding** to training
4. To measure **progress**, that is translatable into performance

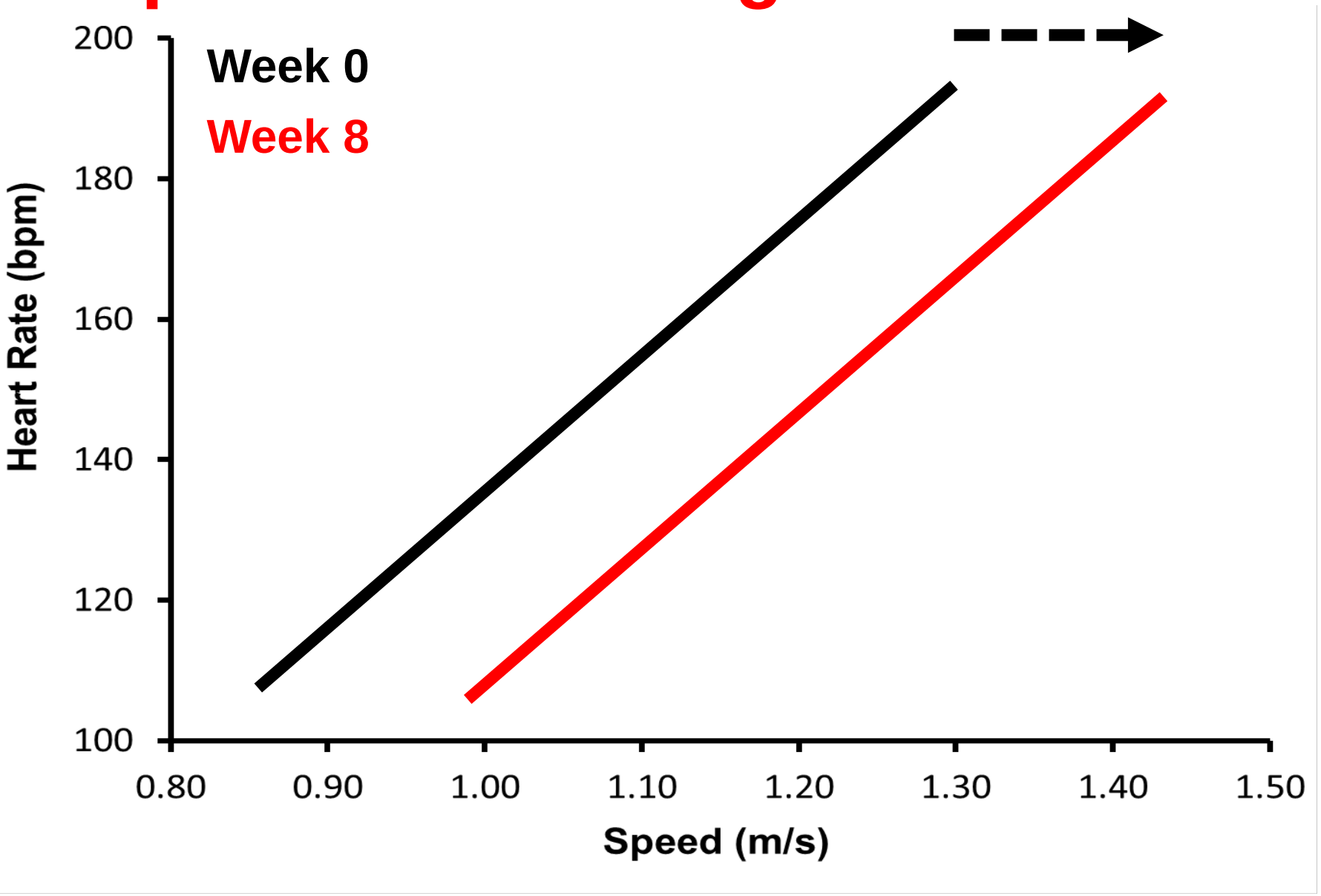
Potential


200
180
160
140
120
100
Heart Rate (bpm)
0.80
0.90
1.00
1.10
1.20
1.30
1.40
1.50
Speed (m/s)

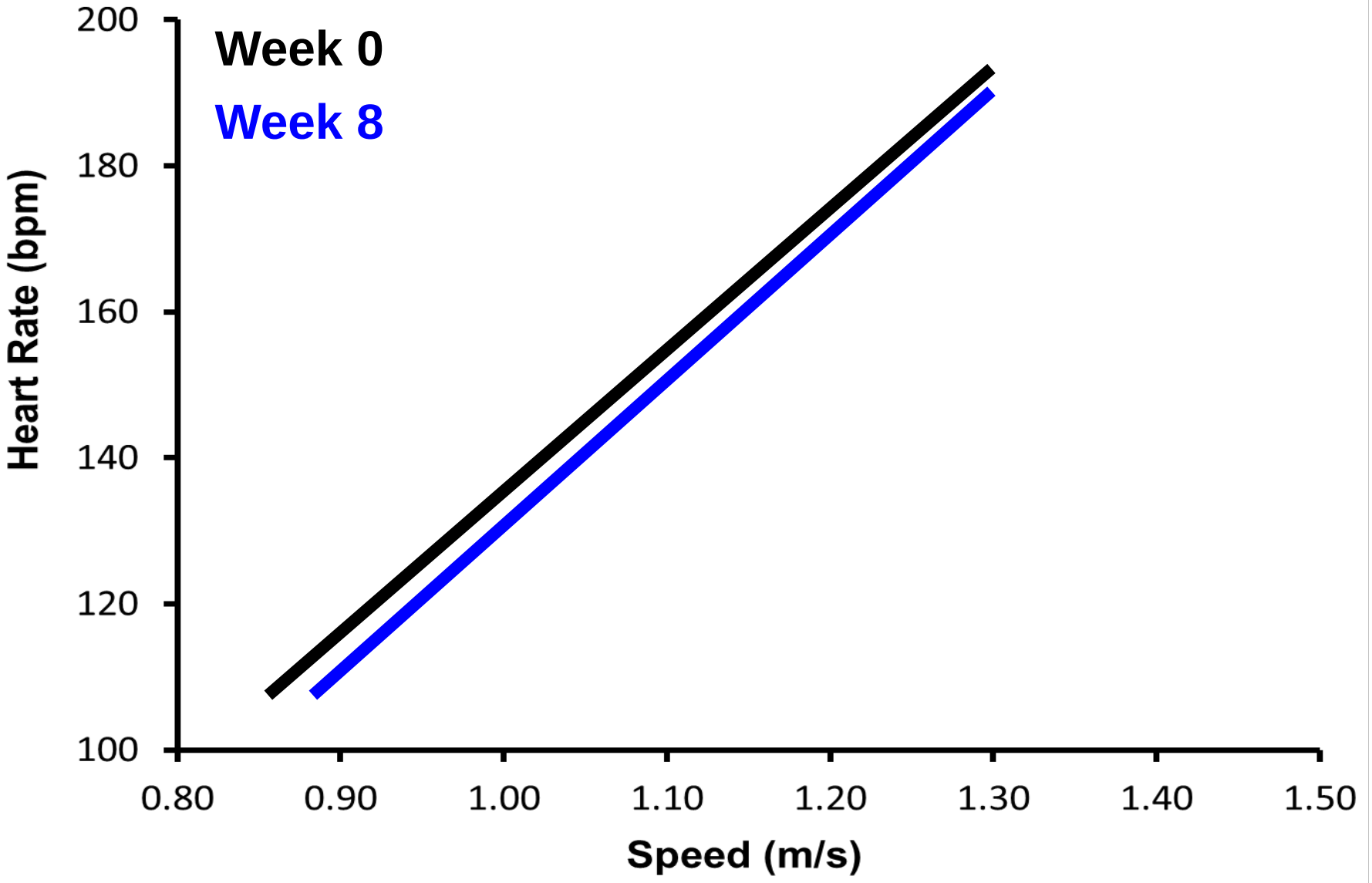
Current Status



Response to training



Response to training



Performance evaluation:

Female S10, 1 year prior to Paralympics

ParaPan Am TORONTO 2015

ΔTest Performance

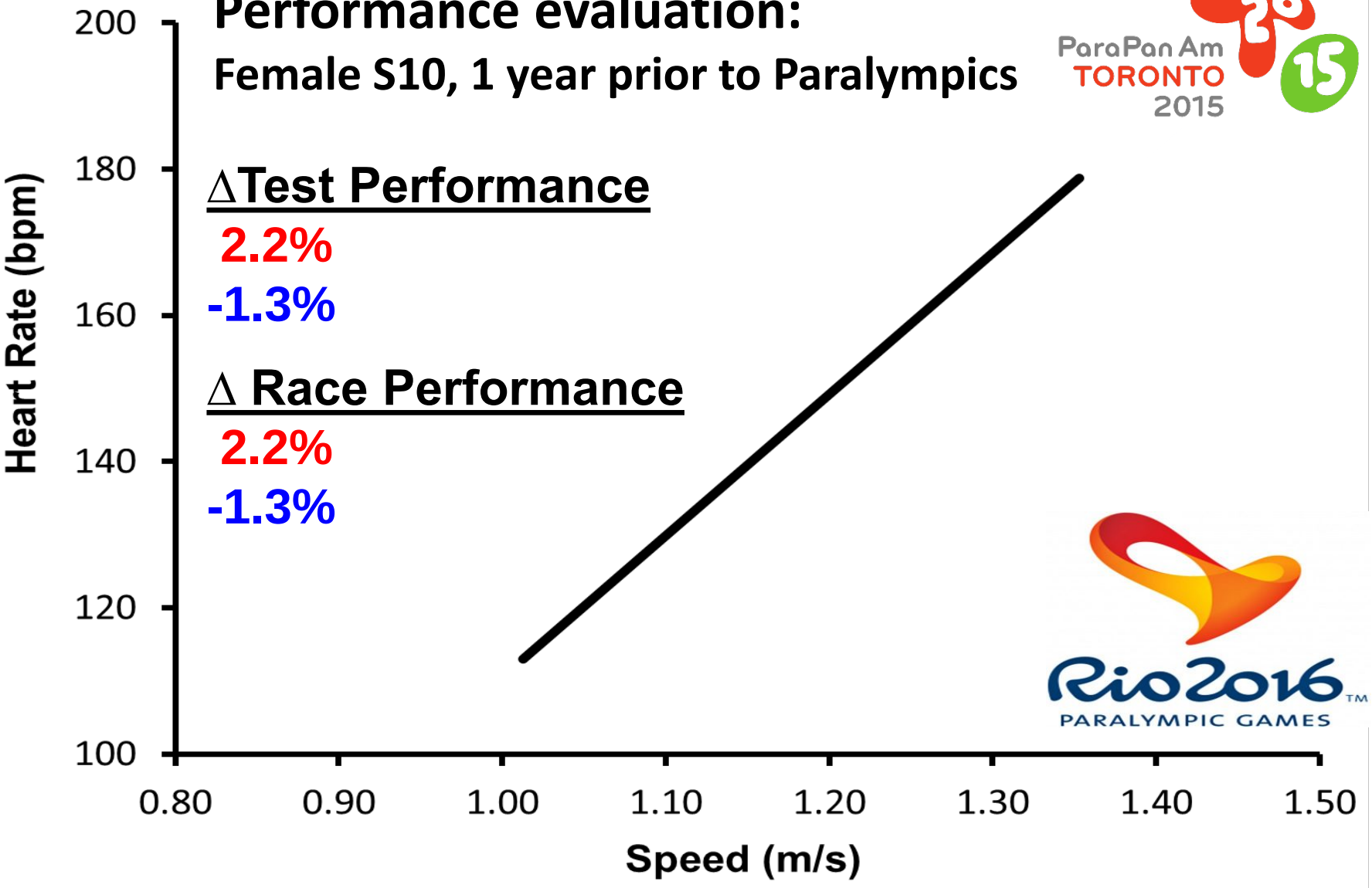
2.2%

-1.3%

Δ Race Performance

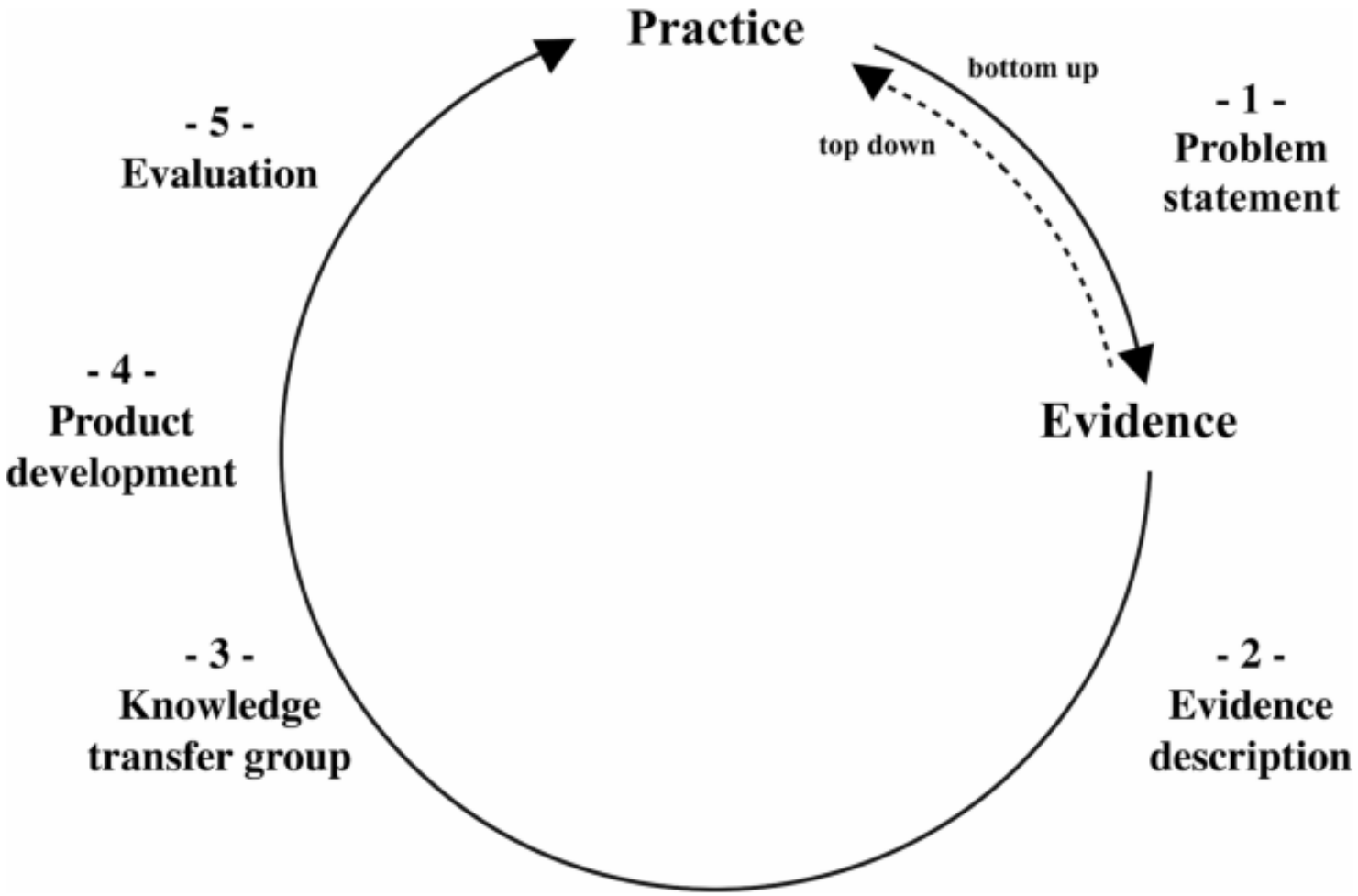
2.2%

-1.3%



Rio2016 PARALYMPIC GAMES

Bridge the gap between science and practice: knowledge transfer



Verhagen et al., BJSM, 2014.

Example from Canadian Para-swim team Competition Warm-up

84±11 mins

Gap time

43±5 mins

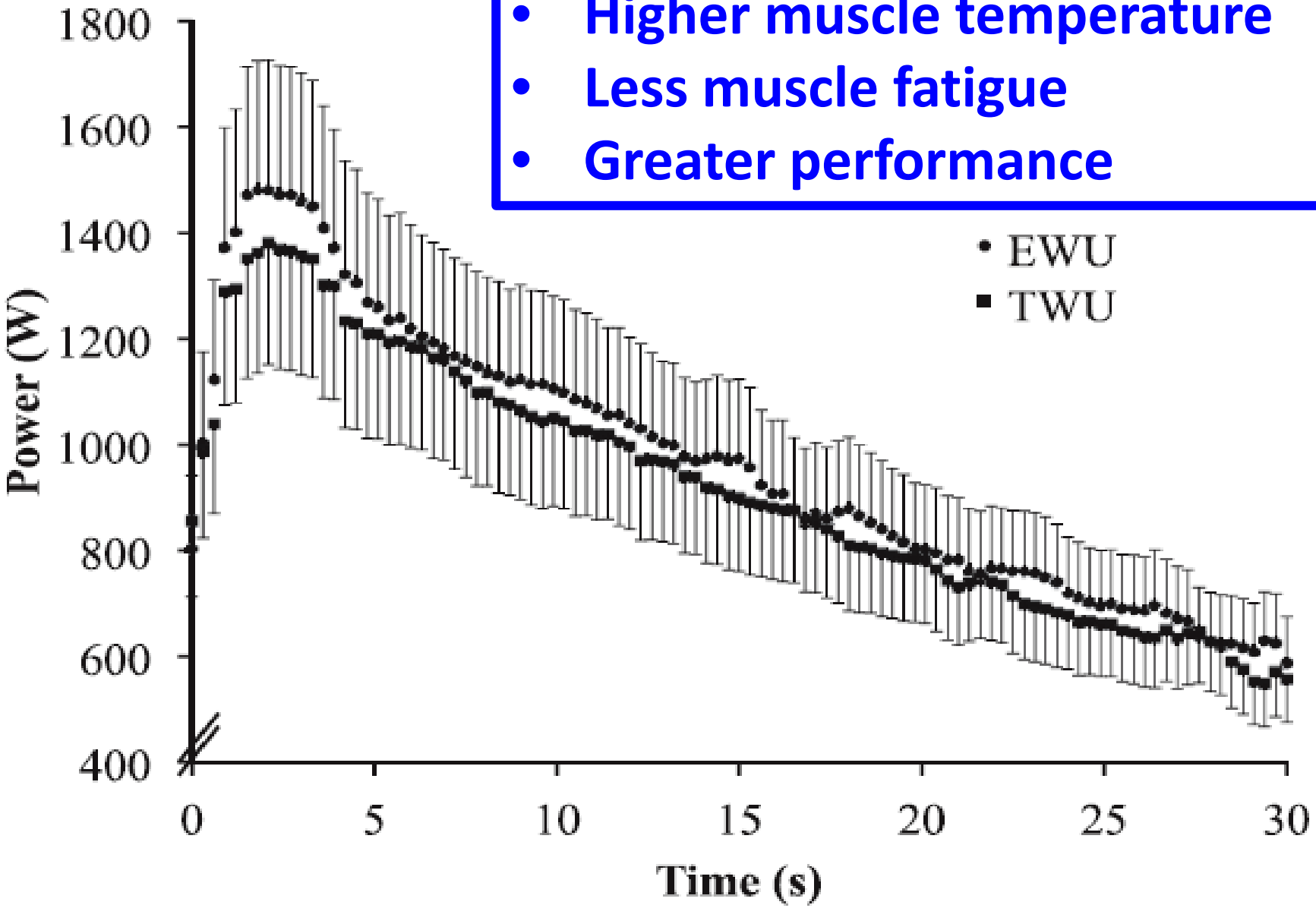
41±9 mins

Timeline - Day 2 Finals

Swimmer	Event	Gun Time	Ready Room	Suits	end of warm-up	start of warm-up
	100 Breast	1859	1844	1820	1815	1745
	100 Breast	1936	1921	1900	1845	1800
	100 Breast	1936	1921	1900	1855	1810
	200 IM	2023	2008	1950	1940	1900
	200 IM	2023	2008	1955	1945	1905
	200 IM	2028	2013	2000	1950	1850
	100 Breast	2050	2035	2015	2000	1915
	50 Free	2059	2044	1940	2025	1955

Experimental Warm-up (EWU):

- **Higher muscle temperature**
- **Less muscle fatigue**
- **Greater performance**

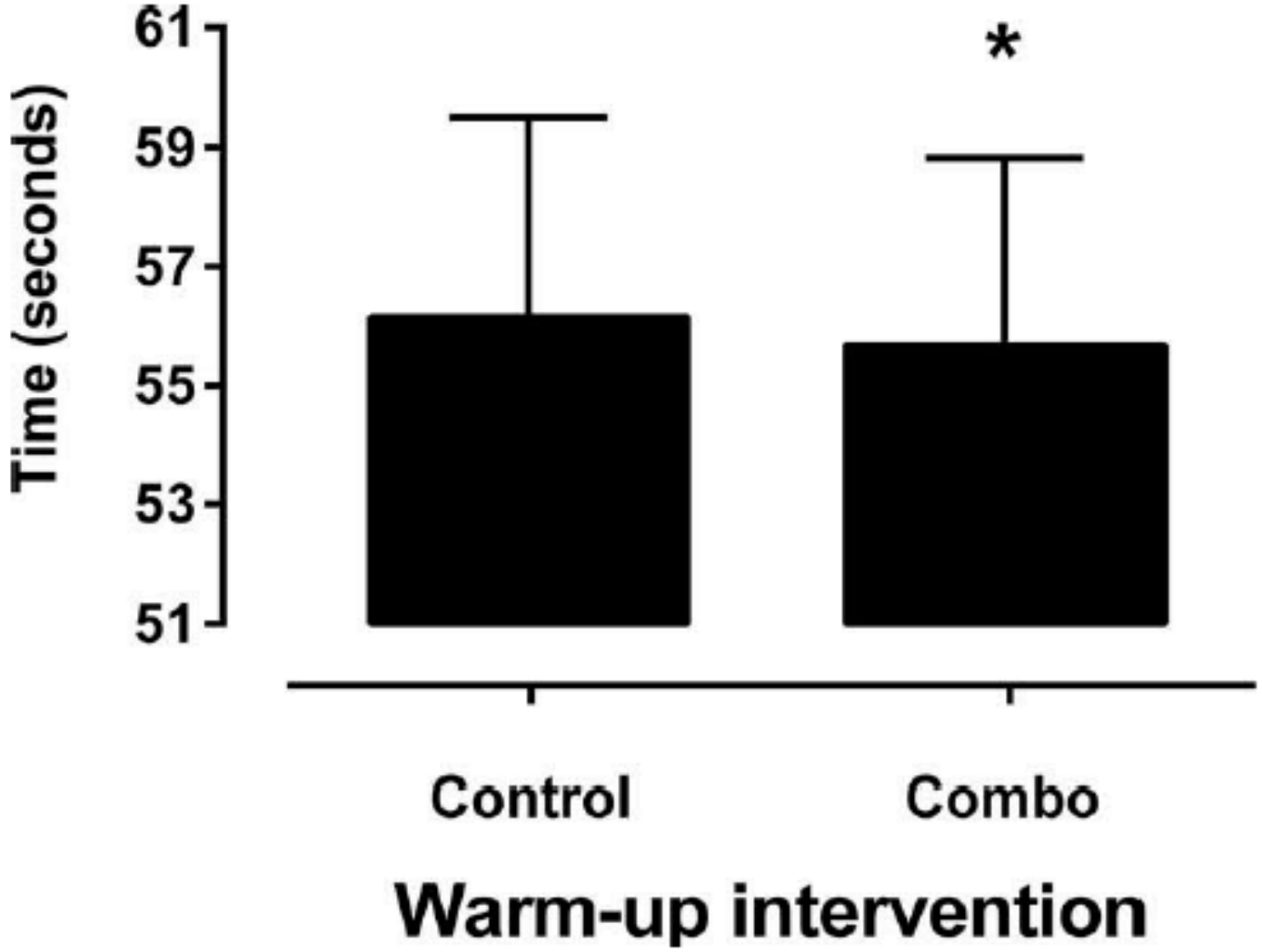


Tomaras and MacIntosh, JAP, 2011.

Turning theory into practice

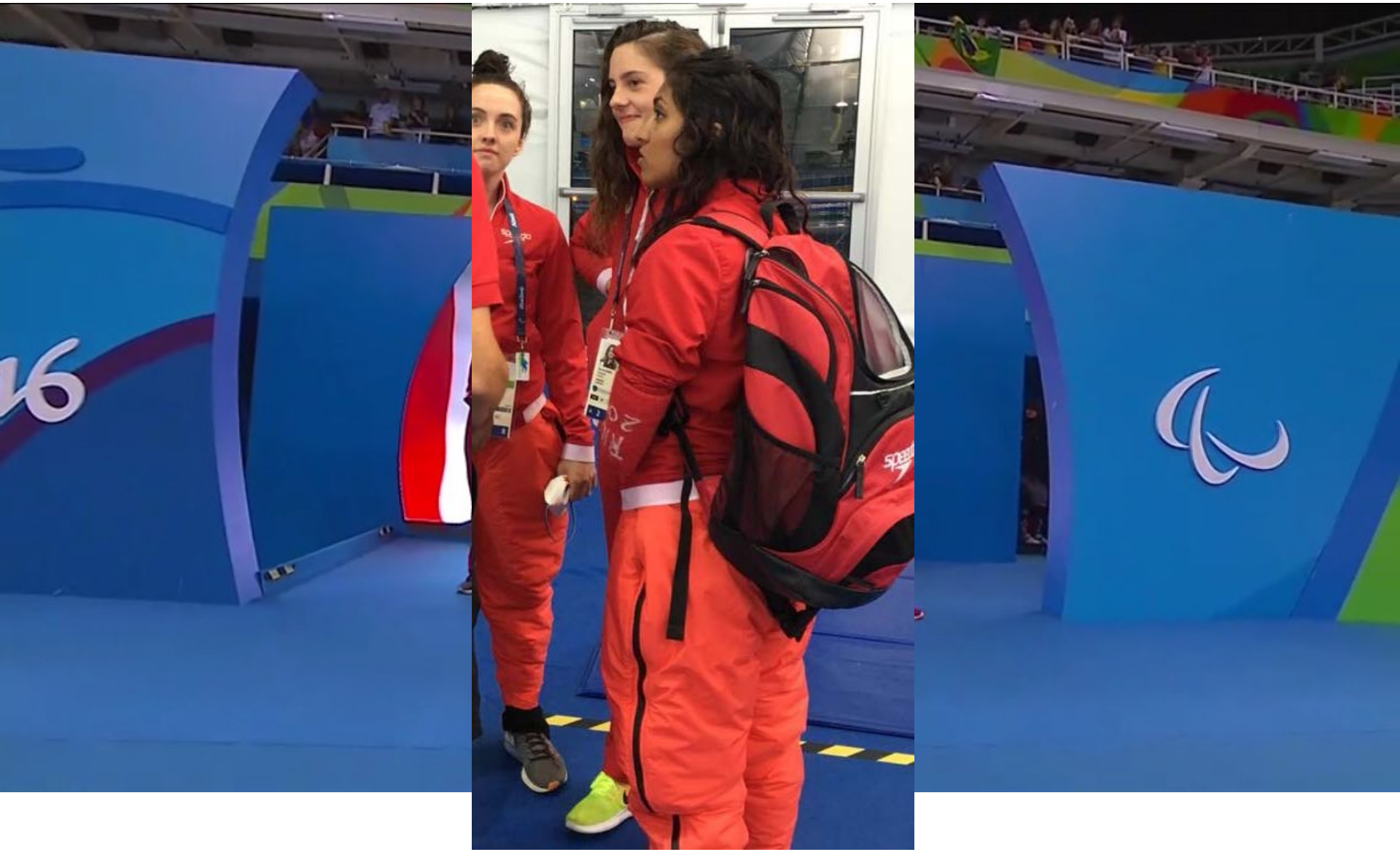
- **Passive heating**
- **Remain active**
- ***Without fatigue***

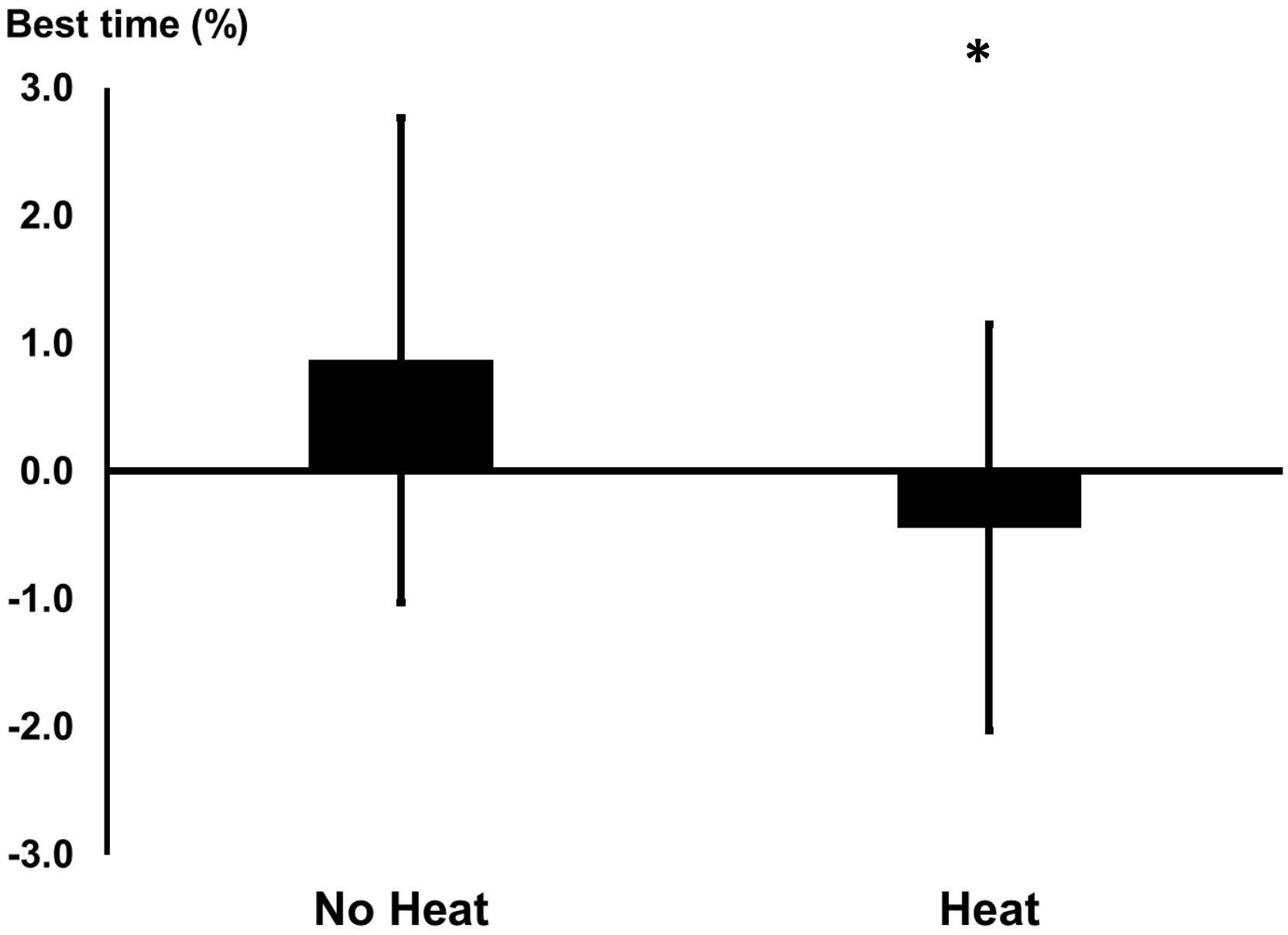
0.8% (0.5s) improvement



McGowan et al. J Sport Sci, 2016.

Swim warm up



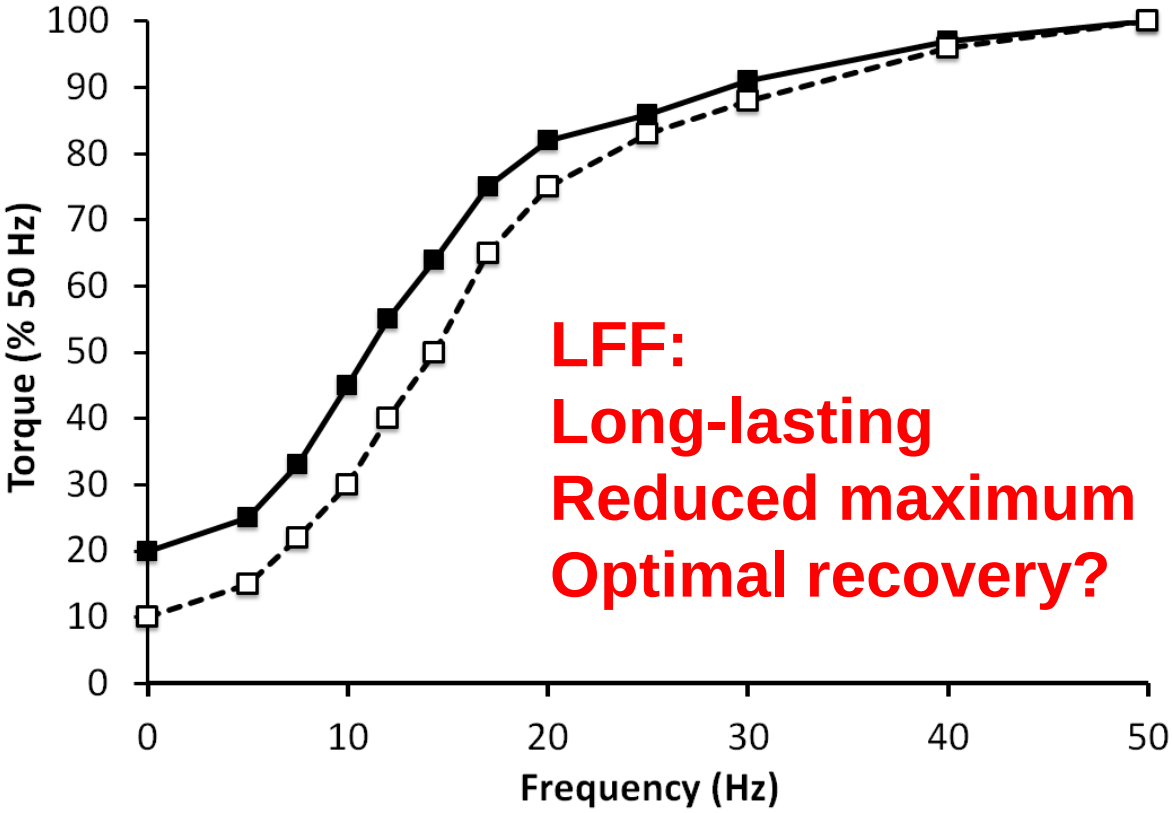


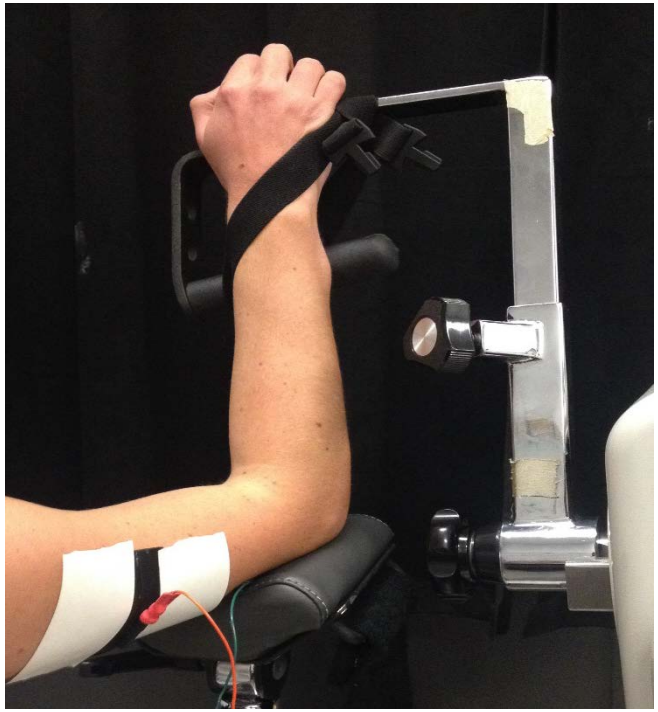
*p<0.002

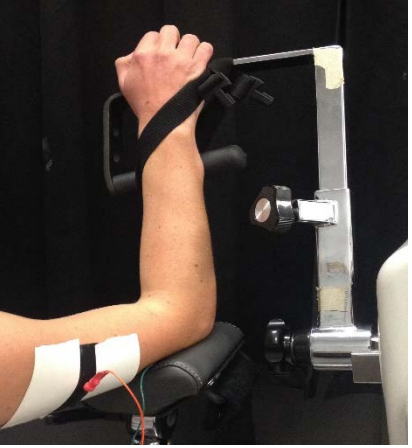
Sport scientists doing science

Fatigue present during recovery is called low-frequency fatigue (LFF)

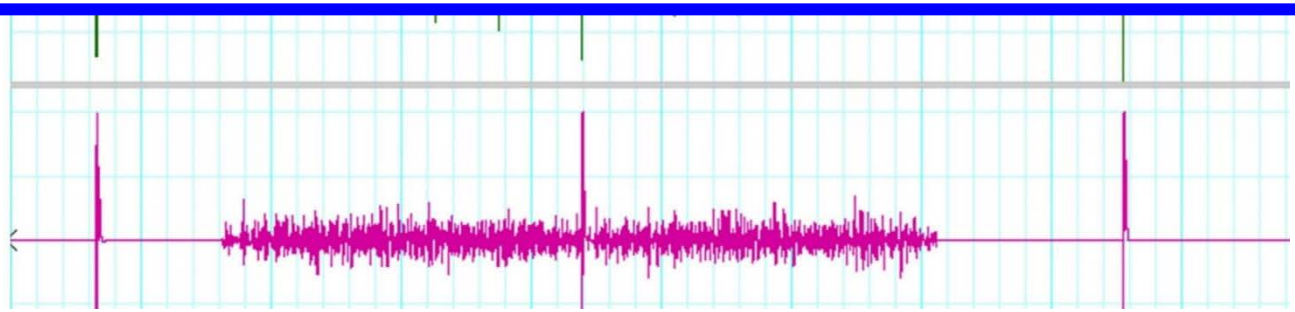
Is LFF present in our athletes?







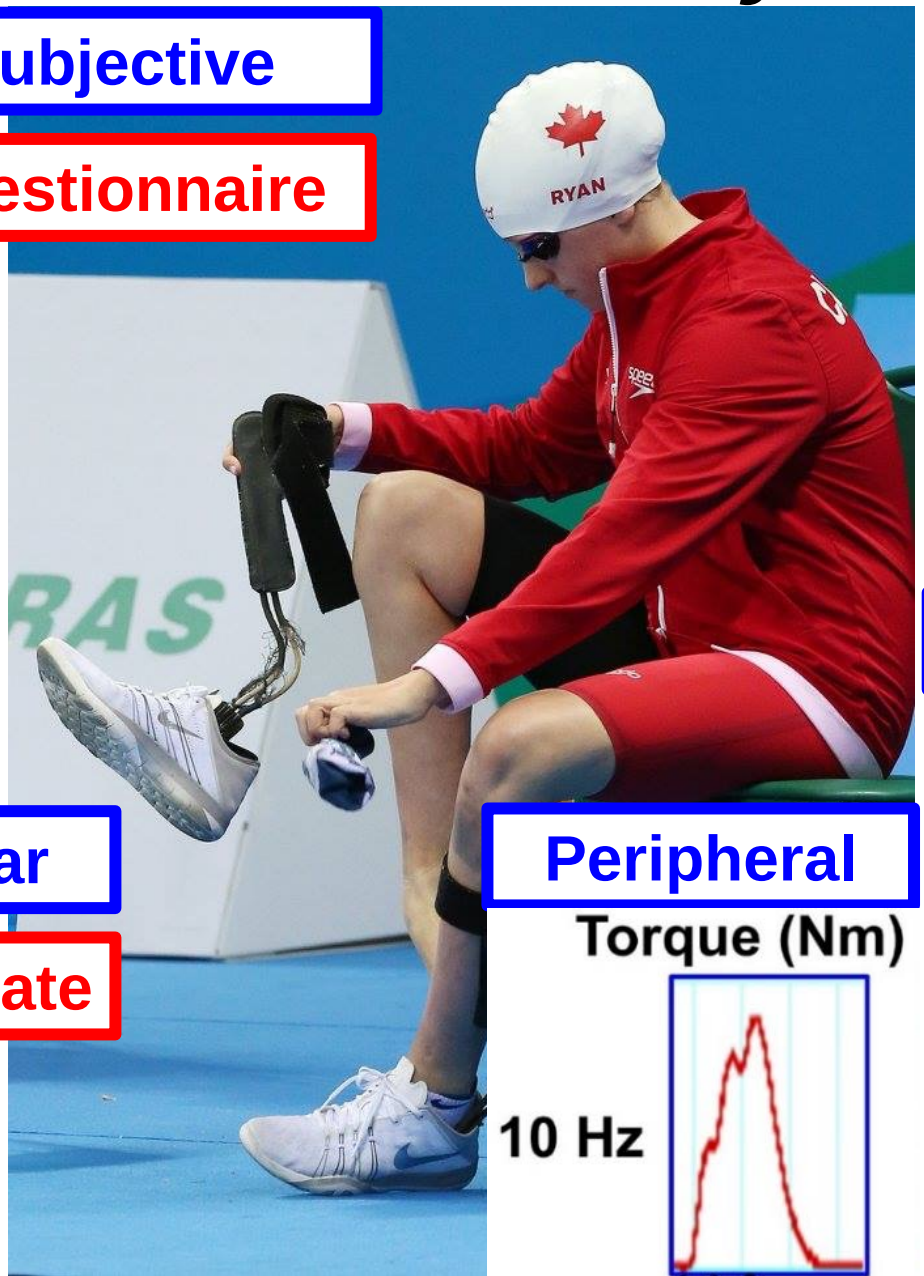
- **Does low-frequency fatigue differ between sport classes?**
- **Does low-frequency fatigue relate to other objective and/or subjective markers of fatigue in athletes?**
- **Can we use this information to guide training prescription?**



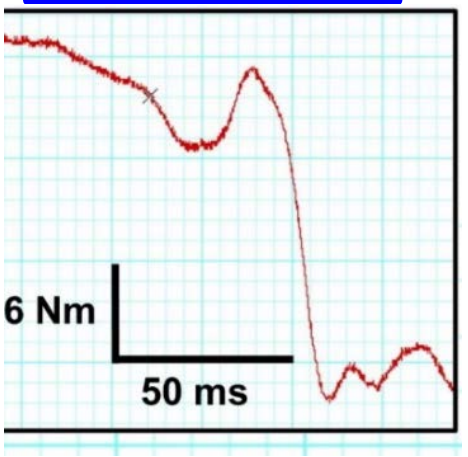
Coach: *"Is athlete ready to train?"*

Subjective

Questionnaire



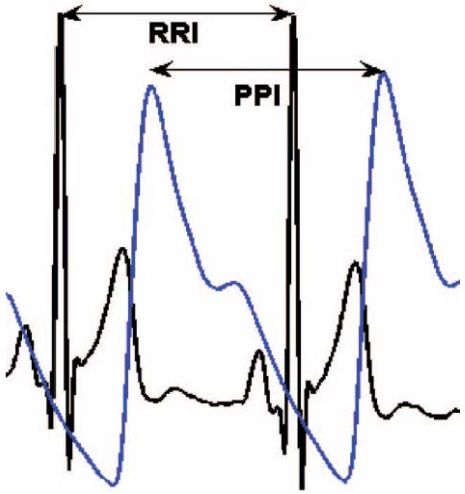
Central



Effort Perception

RPE, sRPE

Neurological



Cardiovascular

Training heart rate

Peripheral

Summary

- **Sport physiologists attempt to:**
  - Synthesize data regarding:
    - Athlete adaptation/response to training
    - Athlete capabilities and limitations
  - Bring research theory into practice
  - Communicate that information to the coach, in a way he/she can understand
- **Challenges:**
  - Performing the research in decentralized program
  - Disseminating the knowledge to the home program

Canadian IST Model: The process of building the IST

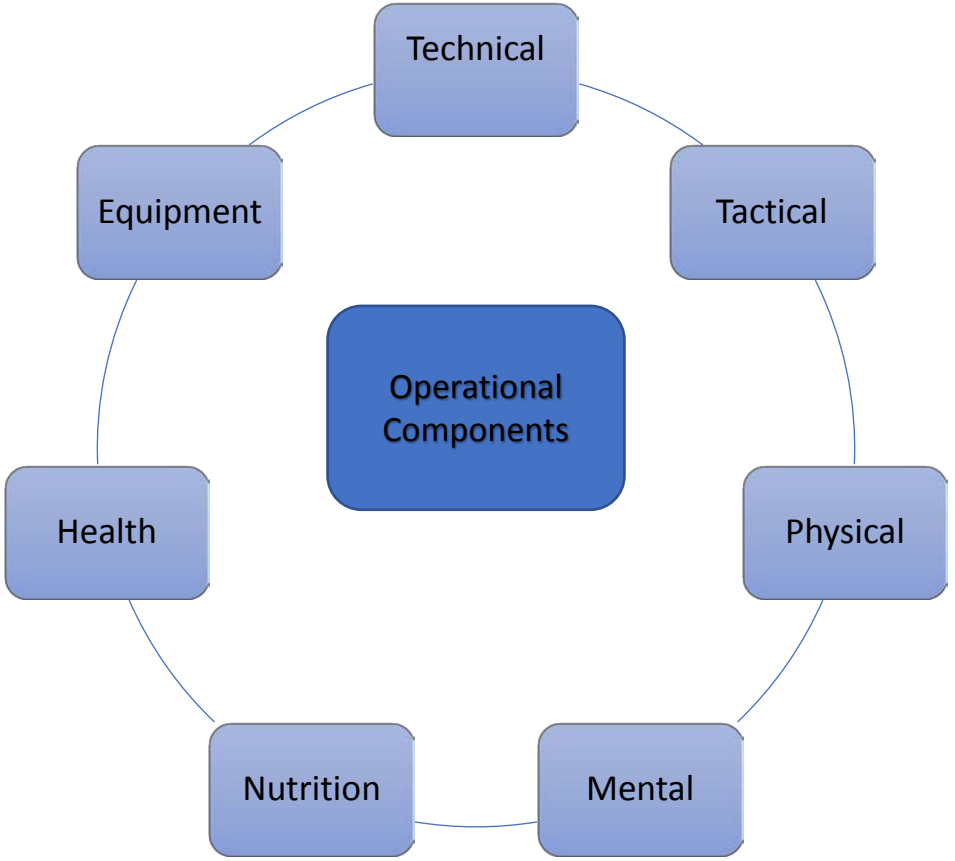
Provide the vision for the program

The process of building the IST

Determine the style of play or athlete you want

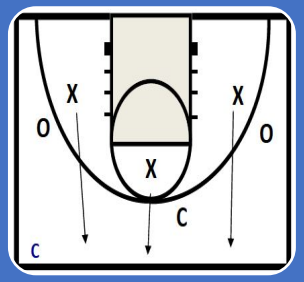
The process of building the IST

Outline the key elements that you want



Technical

- Review and analysis of skills to improve and raise the foundation of your basketball game to an international level



Tactical

- Review and analysis of patterns and decisions to improve and raise the foundation of your basketball game to an international level.

Mental

- Improve ability of athlete to achieve ideal performance state through enhanced self awareness and other skills

Physical

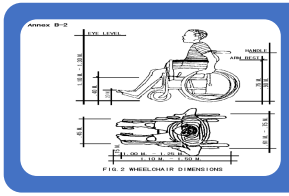
- Prepare an athlete to meet the physical demands of wheelchair basketball at the international level

Health

- Assess, treat, and run preventative programming to allow the athlete to train and compete in the best health as possible

Nutrition

- Help the athlete acquire the necessary energy to compete at the international level



Equipment

- Develop enhanced technique for certain skills to minimize injury risks and maximize desired skill

The process of building the IST

Meet with each IST member to establish outcomes, measures and plans

The process of building the IST

Meet with the whole group to align the plans

Canadian IST Model: The Coaches Role

Establish a clear vision, style and elements

Canadian IST Model: The Coaches Role

Provide the outcome for each element

Canadian IST Model: The Coaches Role

Let each IST be the expert in their area

Canadian IST Model: The Coaches Role

Connect the different areas

Canadian IST Model: The Coaches Role

Encourage creativity in achieving the outcome and in coming up with new ideas

Canadian IST Model: The Coaches Role

Balance long-term baking and short term fixes

Canadian IST Model: The Coaches Role

Remember they are a team and they are part of the team so develop them with that in mind

CANADA