Orthostatic hypotension among elite wheelchair athletes

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Objectives:

1) Outline current paralympic classification of wheelchair rugby athletes
2) Present cardiovascular responses in wheelchair rugby athletes
3) Outline future directions for the integration of autonomic assessments into paralympic athlete classification

Athletic Training/Performance

Q1. What does our body do when we start to exercise?

- Increased heart rate
- Increased blood pressure
- Increased peripheral blood flow (musculature!)
- Increased respiration

These changes occur to fuel our body to keep up with the high physical demands of exercise!

Athletic Training/Performance

Q2. What is different for people with SCI?

- Resting BP is usually low
- Persistent orthostatic hypotension
- Post-exercise induced hypotension
- Poor response in heart rate
- Episodes of uncontrolled autonomic dysreflexia

These result in decreased athletic performance and could encourage some unusual techniques used by wheel chair athletes (i.e. Boosting) to compensate for the abnormal cardiovascular control!

The Paralympic Games

Summer Games

- Wheelchair Rugby
- Wheelchair Basketball
- Wheelchair Fencing
- Wheelchair Tennis
- Boccia
- Football
- Goalball
- Archery
- Cycling
- Equestrian
- Volleyball

- Judo
- Powerlifting
- Rowing
- Sailing
- Shooting
- Swimming
- Table tennis

Winter Games

ing

vancouver 2010
PARALYMPIC GAMES
JEUX PARALYMPIQUES

Wheelchair Rugby Classification

- Bench Test (ball handling ability)
- Functional Trunk Test (trunk stability)
- Functional Movement Tests (maneuvering ability)
- On-Court Evaluation

Rugby Classes Profile:

- 1st class – 0.5
- 2nd class – 1.0
- 3rd class – 1.5
- 4th class – 2.0
- 5th class – 2.5
- 6th class – 3.0
- 7th class – 3.5

Total players on the court: **4**

Total score allowed: **8.0**

- **What do we know about SCI patients?**
  - Episodes of autonomic dysreflexia
  - Resting hypotension
  - Orthostatic hypotension
  - Post-prandial hypotension
  - Post-exercise induced hypotension
  - Arrythmias
  - Poor heart rate response during exercise

(Clayden, Hall, Eng, Krassioukov, 2005)

The Paralympics

Current classification of wheelchair athletes does not take into account autonomic functions -

placing some athletes at a distinct advantage or disadvantage in comparison to others, especially those with SCI.

Study Objectives and Design:

- **Objective:** To develop a validated system for functional autonomic assessment of wheelchair Paralympic athletes
  - In consideration of “fair play” and safety.
- Research Design: prospective, cross-sectional study
- Research participants:
  - male and female wheelchair athletes,
  - Ages 18-45

Subjects:

- Paralympians from **five** international rugby teams
- Total number: **25 male**
- Cervical/Thoracic: **22/3**
  - **C5 2**
  - **C6 10**
  - **C7 9**
  - **C8 1**
  - **T1-5 3**
- Average time post SCI:**13±5 years**
- Average age: **32±5 years**
- **Classifications**
  - 0.5-1.5 9 players (36%)
  - 2-2.5 12 players (48%)
  - 3-3.5 4 players (16%)

Orthostatic Sit-Up Test

Protocol of Study –

1. 10 minutes rest
2. Orthostatic challenge test

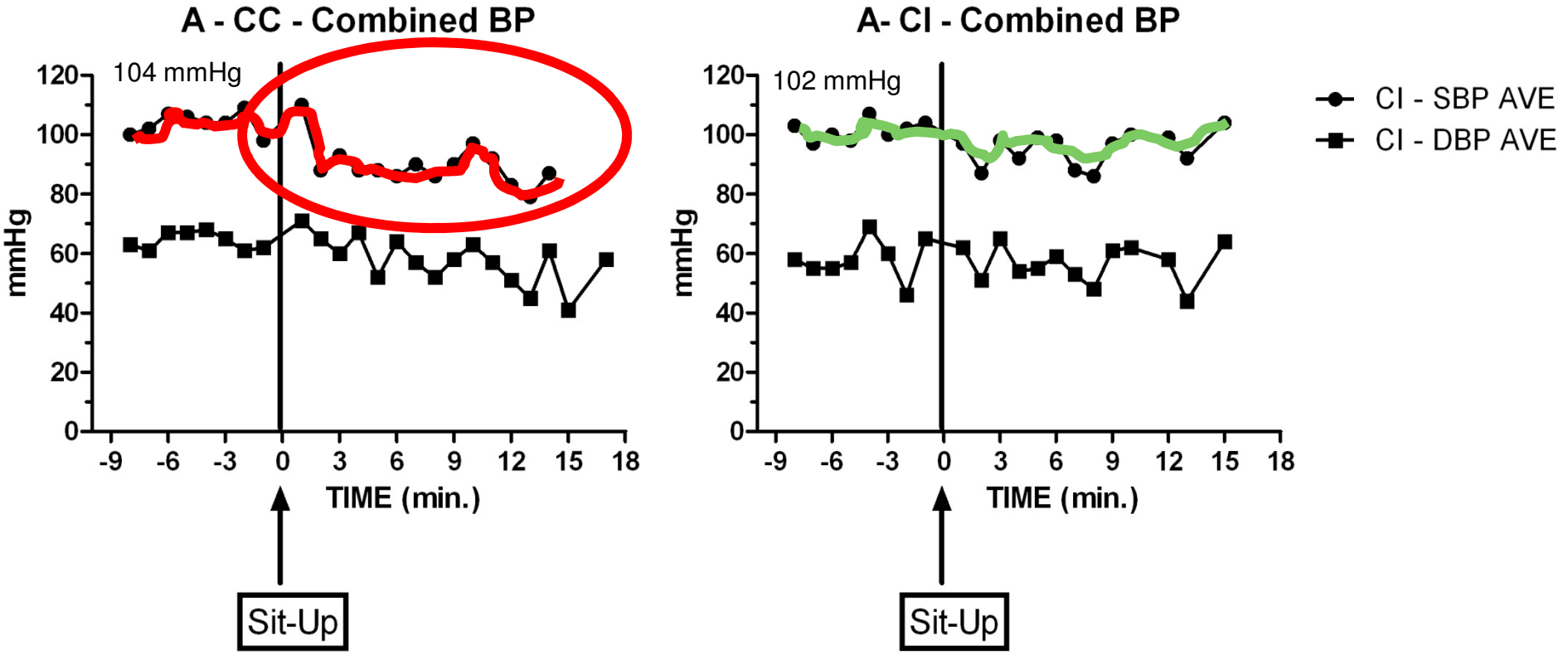
Parameters Recorded–

1. Resting SBP/DBP and HR
2. BP and HR responses to orthostatic challenge
3. Sympathetic Skin Responses
4. Symptoms during orthostatic test

Changes in blood pressure following sit up test in individuals with cervical complete (n=10) and incomplete (n=12) SCI

Average classification = 1.80

Average classification = 1.88



***Orthostatic hypotension was observed in ~43% of subjects**

***Many developed dizziness and lightheadedness!**

Most common symptoms during sit-up test

COMPLETE

- Light-headedness (10%)
- Dizziness (20%)
- Test-stopped or interrupted (0%)
- Syncope (0%)

INCOMPLETE

- Light-headedness (8%)
- Dizziness (25%)
- Test stopped or interrupted (0%)
- Syncope (0%)

*Overall, 43% of these elite wheelchair athletes developed orthostatic hypotension

Conclusions:

- It was documented previously that cardiovascular dysfunctions including orthostatic hypotension are common among individuals with SCI

- We are presenting novel information that up to 43% of elite Paralympic athletes experience symptomatic orthostatic hypotension during international competition.

- Together with the International Paralympic Committee (IPC), we propose the need for the addition of autonomic evaluations into future Paralympic classification.

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