Autonomic Cardiovascular Control and Sports Classification in Paralympic Athletes with Spinal Cord Injury

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Wheelchair Rugby Classification

• Wheelchair Rugby is a sport for tetraplegic male and female athletes. Players are classed into one of seven classes: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0 and 3.5, depending on their functional ability. The higher classes are assigned to those players that have higher functional levels and the lower class players are players with less function.

• There are three off the court components used to determine players' classification:
  • Bench Test - a muscle test is performed on all upper extremity musculature, in addition to an examination of range of motion, tone and sensation.
  • Functional Trunk Test - assessment of the trunk and lower extremities in all planes and situations, this may include a manual muscle test of the trunk muscles.
  • Functional Movement Tests - pushing, turning, stopping, starting, holding your chair against resistance, dribbling, passing, rimming and transferring are some of the functional skills that may be evaluated.
  • A player will also be evaluated on the court, while playing; to help determine which class he/she falls into.
  • During the game, the total value of all the players on the court for a team cannot exceed eight points. This ensures that teams must field a mix of athletes of all functional levels.
Objectives

• To present a concept of clinical/neurological classification of spinal cord injury (SCI)

• To introduce concept of clinical AUTONOMIC classification of SCI individuals

• To describe association with cardiovascular control and Paralympics sport classification.

• To outlined future plans
Fight and flight response
Clinical evaluation of the severity of SCI. What is missing?

From Frankel scale (1969) to International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI) – ASIA Impairment Scale

1st edition 1982
2nd edition 1987
3rd edition 1889-90
4th edition 1992
5th edition 1996
6th edition 2000
7th edition 2011

Autonomic nervous system assessment?
Sympathetic NS
Parasympathetic NS (Vagus n)

Chest and blood vessels of the upper extremity

Gut and blood vessels of the lower extremity

Tetraplegia
- Neurogenic shock
- Abnormal HR responses
- Low resting blood pressure
- Orthostatic hypotension
- Autonomic dysreflexia
- Loss of sweat response below of SCI

Paraplegia T6
- Orthostatic hypotension
- Autonomic dysreflexia
- Loss of sweat response below of SCI
Motor-Sensory completeness SCI versus Autonomic completeness SCI
2009. Introduction of the International Autonomic Standards

International Standards on documentation of remaining Autonomic Function after SCI (ISAFSCI)

1st edition 2009
2nd edition 2012
REVIEW

Influence of the neurological level of spinal cord injury on cardiovascular outcomes in humans: a meta-analysis

CR West¹,²,₄, P Mills¹,²,₄ and AV Krassioukov¹,₂,₃

A. Supine

B. Seated
Take home message:

• We need further research and validation of our present data with respect to a possible addition of autonomic testing to the current functional Paralympic sport classification.

• We believe that only a few sports could benefit from this addition.

• We hope to continue working closely with the IPC on our mandate to educate Paralympic athletes about cardiovascular health after SCI, including the possible harmful effects of boosting and autonomic dysreflexia.
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