Performance Point

The Wheelchair Athlete:
Adapted Test Considerations

Canadian Sport Centre Pacific / Centre canadien multisport Pacifique

by Jane LaBreche, Physiologist, Canadian Sport Centre Pacific January 2008

Physiological testing protocols are developed by sport scientists to provide feedback to coaches and athletes coinciding with their yearly training plans. These tests are designed to be sport specific as well as physiologically relevant (energy system used, muscle groups involved, among others). In Paralympic sport, the functional specificity of testing should also be considered. The wheelchair athlete population is unique and from a sport science perspective there is much to be learned as there is a wide variety and range of physiological function. Athletes can range from minimal disability (arthritic knees) to limb amputation to spinal cord injury and paralysis. Each athlete presents a unique physiological make-up and therefore requires appropriate testing and most importantly, appropriate interpretation of the results.

Canadian Sport Centre Pacific Physiologist, Jane LaBreche, obtaining a blood lactate sample from Brad Lennea of the Canadian National Para Alpine Team

Specificity of a Disability (examples)

Able Bodied

These athletes are unique in that they probably have partial or full muscle mass volume in the legs. This also means additional (inactive) weight to carry in the chair that is not contributing to exercise. They may appear to be less efficient (per kg) in some tests when compared to athletes with atrophied legs that have a reduced weight.

Canadian Women's Wheelchair Basketball team with head coach Tim Frick

Limb Amputee

The lung and heart may function normally but are affected by a decrease in blood volume, blood circulation distribution changes and a decrease in overall muscle mass. Any measurements made per kilogram should also be reviewed in absolute values. For example, an amputee who is lighter without his/her leg may appear more fit or stronger per kilogram than another athlete who has both legs intact.

Spinal Cord Injury

Pulmonary function, cardiac function, and muscle mass recruitment/activation are impaired to some degree in these individuals. Therefore any metabolic data will need to be interpreted incorporating the effect of the individual's function and capacity on his/her test results.

Considerations For Testing

Protocols

- Use arm and shoulder protocols where needed
- Include torso (abdominals/back/hips) depending on functionality
- Adjust orientation of the equipment for posture and positioning
- Adjust workloads depending on the spinal cord injury level (if applicable)
- Use lab tests to show basic function
- Use field tests to show application to sport and to reflect skill level

Results

- Report in relative (per kg) AND absolute values
- Group athletes into appropriate categories based on sport classifications for comparison
- Determine expected results and norms according to sport classifications and/or physiological function of each athlete

Interpretation

- Specificity and validity of the test – are athletes being tested within their abilities?
- Active muscle mass – has paralysis caused atrophy in the legs, abdominals, lower back? How does this affect wheeling technique, wheeling efficiency, power, speed and/or acceleration?
- Lung function - has paralysis affected the diaphragm and/or intercostals? What affect does that have on oxygen delivery? If able-bodied, what percentage of their true maximum are athletes working at?
- Cardiac Function – has blood distribution changed due to paralysis, amputation, or inactivity of able bodied legs? How might that affect heart rate or oxygen consumption?
- Health – are medications for medical conditions affecting heart rate or muscle activation?
- Limb and torso length – does this affect the efficiency of wheeling, or the ease of skills needed in the sport or during a test?

Canadian Wheelchair Rugby team during a training session

For more information on wheelchair sports, please visit the Canadian Wheelchair Sports Association website.

For more information on effective testing for wheelchair athletes, please consult your Canadian Sport Centre Pacific Physiologist.