Infographic: Thermoregulatory impairment in athletes with a spinal cord injury

This item was submitted to Loughborough University's Institutional Repository by the/an author.


Additional Information:

- This article has been accepted for publication in British Journal of Sports Medicine, 2019 following peer review, and the Version of Record can be accessed online at http://dx.doi.org/10.1136/bjsports-2018-099853. © Authors

Metadata Record: https://dspace.lboro.ac.uk/2134/36487

Version: Accepted for publication

Publisher: BMJ Publishing Group © The Authors

Rights: This work is made available according to the conditions of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) licence. Full details of this licence are available at: http://creativecommons.org/licenses/by-nc-sa/4.0/

Please cite the published version.
Infographic: Thermoregulatory impairment in athletes with a spinal cord injury

Katy E. Griggs¹,², George Havenith³, Michael J. Price⁴ and Victoria L. Goosey-Tolfrey¹

¹ The Peter Harrison Centre for Disability Sport, School for Sport, Exercise and Health Sciences, The National Centre for Sport and Exercise Medicine, Loughborough University, UK.

² Department of Engineering, School of Science and Technology, Nottingham Trent University, Nottingham, UK.

³ Environmental Ergonomics Research Centre, Loughborough Design School, Loughborough University, Loughborough, UK.

⁴ School of Life Sciences, Centre for Sport, Exercise and Life Sciences, Coventry University, Coventry, UK.

Corresponding author: V.L.Goosey-Tolfrey

Email: v.l.tolfrey@lboro.ac.uk

Telephone: 01509 226386
Presented in this infographic is a summary of studies investigating the thermoregulatory impairment of athletes with a spinal cord injury during real-world sporting scenarios. The infographic depicts the heightened thermal strain experienced by athletes with tetraplegia (high level lesions), both compared to athletes with paraplegia (low level lesions) and within the sport of wheelchair rugby. In addition to the cooling interventions presented, the infographic highlights the significant need for appropriate interventions to reduce the risk of overheating and potential performance decrements. This infographic was field tested with those who work within a wheelchair sports environment, ranging from practitioners, researchers, athletes with an SCI and sports clinicians. The experimental studies were also designed in consultation with the wheelchair rugby coaches and players.

References


Acknowledgments
The authors would like to thank Adam Pryor, National Centre for Sport and Exercise Medicine, Loughborough University who designed the infographic.
Thermoregulatory impairment in athletes with a spinal cord injury

A spinal cord injury (SCI) results in:

- **Sweating response**: Reduced sweating response
- **Blood flow control**: Reduced blood flow control

**Lab setting**

<table>
<thead>
<tr>
<th></th>
<th>Distance covered</th>
<th>Core temperature change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetraplegia</td>
<td>2.8 km</td>
<td>Same as no cooling</td>
</tr>
<tr>
<td>Paraplegia</td>
<td>3.0 km</td>
<td>Same as no cooling</td>
</tr>
</tbody>
</table>

**Game setting**

<table>
<thead>
<tr>
<th></th>
<th>Distance covered</th>
<th>Core temperature change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetraplegia</td>
<td>4.8 km</td>
<td>Peak core temperature 0.6°C lower than no cooling</td>
</tr>
<tr>
<td>Non-SCI</td>
<td>5.5 km</td>
<td>Same as no cooling</td>
</tr>
</tbody>
</table>

The core temperature of athletes with tetraplegia rises rapidly during exercise (in a 19-20°C environment) causing an overheating risk and potential performance decrements.

**Possible practical solution**

For athletes with tetraplegia

- **Ice vest before exercise**
- **Water sprays during breaks in play**

**Summary**

- **TP: heightened thermal strain** during simulated and wheelchair rugby match play compared to PP and non-SCI.
- **Employ appropriate cooling methods**, e.g., ice vests and water sprays.
- **Alternative practical methods may also be beneficial.**

**References**


**Acknowledgements**

This infographic is a summary of PhD studies carried out by Dr. Katy Griggs at the Peter Harrison Centre for Disability Sport, Loughborough University. Designed by Adam Pryor, National Centre for Sport and Exercise Medicine, Loughborough University.

Wheelchair sport images are adapted from Parutakupiu’s wheelchair rugby pictogram, via a Creative Commons BY-SA licence: commons.wikimedia.org/wiki/File:Wheelchair_rugby_pictogram_(Paralympics).svg

This work is licensed by Loughborough University under a Creative Commons BY-NC-SA licence:creativecommons.org/licenses/by-nc-sa/4.0/