Travel forms an integral part of modern-day athletes' lives. The interrelated effects of travel fatigue, jet lag, and increased risk of illness are likely to affect performance unless managed appropriately. Travel fatigue follows any long journey and resolve following a good haul travel on performance. Additionally, central to the detrimental impact of long-distance travel is the misalignment of personal circadian rhythms to the new light–dark cycle.2 Recovery from jet lag requires resynchronisation of the human circadian systems to the new light–dark cycle.2 Various peripheral rhythms resynchronise at different rates but internal desynchronisation progressively disappear as all rhythms synchronise to local time.2,3 Sleep loss appears to be central to the detrimental impact of long-haul travel on performance.2 Additionally, circadian rhythms of numerous psychological and physiological variables with a typical early-morning nadir and late afternoon peak will be misaligned to the new destination time, which, depending on time of competition, could affect performance directly.5 Recovery from jet lag requires resynchronisation of the human circadian systems to the new light–dark cycle.2

Most evidence on travel fatigue and jet lag management is from non-athletic populations in laboratory settings.2 Interventions commonly promoted include: light exposure/avoidance, sleep, exercise, nutrition, melatonin, stimulants and sedatives.3 Their application and timing depends on number of time-zones crossed, travel direction, length of stay and individual chronotype.2 Illness prevention may seem unrelated to travel fatigue and jet lag management, but if an athlete contracts illness both conditions may be aggravated.4 Based on currently available evidence, practical tips include (figure 1 explains detail):

1. Pretravel
   ► Protect sleep—minimise accumulation of sleep debt and/or bank sleep.1,5
   ► Determine core body temperature minimum (CBTmin) as the majority of jet lag interventions are based around this.2 Assessing CBTmin requires continuous core body temperature (CBT) measurement (eg, ingestible temperature pill), but are invasive, time-consuming and costly.3 In the field, an estimated value can be calculated based on habitual timing of sleep and wake.2 If travelling with a team, individualised timing of interventions is not feasible. Currently, the best practice-led option is to calculate the teams’ average CBTmin and apply interventions accordingly.2

2. During travel
   ► Protect sleep—maximise rest and sleep during a ‘sleep window’ corresponding to night-time at place of departure and when it is easier to initiate sleep.1,5 Sedative usage should be individualised and only by doctor’s order.
   ► Implement illness prevention strategies.4 Avoid touching areas known to carry micro-organisms, and frequently wipe those areas clean, for example, tray table.
   ► Drink to thirst, avoid alcohol and caffeine, and ensure frequent movement around the plane.4

3. Post-travel
   ► Plan light exposure and/or avoidance around CBTmin, depending on timing for east versus west.2
   ► If feasible, coincide training sessions with light exposure. Although sunlight is the best option, indoor training with the aid of artificial light may be an alternative when dark outside. Keep training intensity low for the first few

![Figure 1](http://bjsm.bmj.com/)

**Figure 1** How to manage travel fatigue and jet lag in athletes.

---

1. Section Sports Medicine, University of Pretoria, Pretoria, South Africa
2. School of Exercise and Nutrition Sciences, Queensland University of Technology, Brisbane, Queensland, Australia
3. Research Education Centre, Aspetar Orthopaedic and Sports Medicine Hospital Research Department, Doha, Ad-Dawakh, Qatar
4. Correspondence to Professor Dina Christina (Christa) Janse van Rensburg, Section Sports Medicine, University of Pretoria, Pretoria 0002, South Africa; christa.jansevanrensburg@up.ac.za
days building up to higher intensity and skill-specific training.2

► Melatonin has both chronobiotic (circadian phase-shifting) and hypnotic (sleep-inducing) properties. Product availability, dosages and purity differ between countries. Team doctors should be cautious and preferably use known products.7 The efficacy of melatonin for the treatment of jet lag has recently been questioned.

► Protect sleep—follow a sleep schedule and adjust sleep timings as the body clock adjusts to the new time-zone. Use sleep hygiene interventions and supplement night-time sleep with a daytime nap (this can correspond with light avoidance).3 Sedatives, specifically short-acting (eg, zolpidem 10 mg), may be an option in athletes previously tolerating the drug with no adverse events.8 Athletes should adhere to the most recent WADA regulations for all pharmacological interventions.

► Implement illness prevention strategies.4

► Caffeine may be used to increase alertness and manage daytime fatigue.7

► Meal timing and meal composition may help to reduce jet lag symptoms. Schedule meals according to destination time. Consume protein-rich meals to help with alertness and carbohydrate-rich meals to induce drowsiness.8

We recommend that practitioners focus first on the easier to implement interventions that help treat the symptoms of jet lag (ie, protecting sleep) and prevent illness, before employing more difficult interventions such as accelerating the adjustment of the circadian system to the new time zone. Considering cost of travel research, multicentre studies should be conducted using standardised, simple measures in athletes who travel frequently.

Twitter Dina Christina (Christa) Janse van Rensburg @ChristaJVR, Peter Fowler @fowlerp85 and Sebastien Racinais @ephsiol

Acknowledgements Audrey Jansen van Rensburg.

Contributors DC(C)JvR: manuscript (first draft), manuscript editing, infographic finalisation. PF: manuscript editing, infographic development, infographic finalisation. SR: manuscript editing, infographic finalisation.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sections.

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

© Author(s) (or their employer(s)) 2020. No commercial re-use. See rights and permissions. Published by BMJ.

To cite Janse van Rensburg DC(Christa), Fowler P, Racinais S. Br J Sports Med Epub ahead of print: [please include Day Month Year]. doi:10.1136/bjsports-2020-103163

Accepted 6 November 2020


ORCID iDs

Dina Christina (Christa) Janse van Rensburg http://orcid.org/0000-0003-1058-6992
Peter Fowler http://orcid.org/0000-0002-5853-9119
Sebastien Racinais http://orcid.org/0000-0003-0348-4744

REFERENCES


2 Roach GD, Sargent C. Interventions to minimize jet lag after westward and eastward flight. Front Physiol 2019:10.


