Practical tips to manage travel fatigue and jet lag in athletes

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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.[1] Travel fatigue follows any long journey and resolve following a good night's sleep, but can accumulate with frequent travel.[2] Jet lag ensues misalignment between the internal circadian rhythms and new destination time after rapid travel across more than three time zones,[2–4] resulting in sleep disruption, daytime fatigue and gastrointestinal disturbances.[3 5] Sleep loss appears to be central to the detrimental impact of long-haul travel on performance.[5] 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] Various peripheral rhythms resynchronise at different rates but internal desynchronisation progressively disappear as all rhythms synchronise to local time,[5] probably explaining why athletes often feel worse on day 2–4 compared with day 1 of arrival. The circadian system needs to either advance (east travel) or delay (west travel) depending on travel direction.[2] Eastward travel is generally tougher as endogenous circadian rhythms have an ~25 hours period making it harder to advance than delay your circadian system.[3] Resynchronisation takes approximately 1 and 0.5 days respectively per east and west time-zone crossed.[3] Athletes require a comprehensive travel management plan to minimise impact on performance.[4]

Most evidence on travel fatigue and jet lag management is from non-athletic populations in laboratory settings.[3] 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 6]
- 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. 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]
- In individual cases with known gastrointestinal disturbances, the team doctor may consider to use probiotics.[4]

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 How to manage travel fatigue and jet lag in athletes.

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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).[1] Sedatives, specifically short-acting (eg, zolpidem 10 mg), may be an option in athletes previously tolerating the drug with no adverse events.[4] 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.

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REFERENCES

1 Fowler PM, Knez W, Thornton HR, *et al*. Sleep hygiene and light exposure can improve performance following long-haul air travel. *Int J Sports Physiol Perform* 2020:1–10 https://doi.org/
2 Roach GD, Sargent C. Interventions to minimize jet lag after westward and eastward flight. *Front Physiol* 2019:10.
3 Janse van Rensburg DCC, Jansen van Rensburg A, Fowler P, *et al*. How to manage travel fatigue and jet lag in athletes? A systematic review of interventions. *Br J Sports Med* 2020;54:960–8.
4 Janse Van Rensburg DCC, Jansen van Rensburg A, Schwellnus MP. Coping with jet lag and protecting athlete health when travelling. *Aspetar Sports Medicine Journal* 2019;8:214–22 https://www.aspetar.com/journal/viewarticle.aspx?id=474
5 Fowler PM, Knez W, Crowcroft S, *et al*. Greater effect of East versus West travel on jet lag, sleep, and team sport performance. *Med Sci Sports Exerc* 2017;49:2548–61.
6 Arnal PJ, Lapole T, Erblang M, *et al*. Sleep extension before sleep loss: effects on performance and neuromuscular function. *Med Sci Sports Exerc* 2016;48:1595–603.
7 Piérard C, Beaumont M, Enslen M, *et al*. Resynchronization of hormonal rhythms after an eastbound flight in humans: effects of slow-release caffeine and melatonin. *Eur J Appl Physiol* 2001;85:144–50.
8 Halson SL. Sleep in elite athletes and nutritional interventions to enhance sleep. *Sports Med* 2014;44:13–23.

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