

USOC Jet Lag Countermeasures and Travel Strategies

(for Athletes, Coaches and Athletic Trainers)

There is a clear relationship between sleep and human performance. NASA, the aerospace industry, the US Department of Transportation, thousands of physicians, and 100 years of scientific research support the conclusion that significantly disturbed sleep can have adverse effects on human performance. Anecdotal reports from athletes and some research on athletes have also supported this view.

This brochure will introduce you to a common cause of disturbed sleep in athletes and will provide the information you need to reduce jet lag's adverse impact on sleep and athletic performance.

WHAT IS JET LAG?

The timing of the sleep/wake cycle, and many other biologic processes, is regulated by a biologic clock located in the brain. When we rapidly cross time zones in airplanes, the biologic clock cannot readjust quickly enough. As the body clock scrambles to catch-up, the timing of our biologic processes becomes disrupted and we feel the symptoms identified as jet lag. These include:

- fatigue
- excessive sleepiness
- disorientation
- lightheadedness
- loss of appetite
- gastrointestinal disturbance
- insomnia
- difficulty concentrating

The severity of jet lag is dependent upon several things: the number of time zones crossed, the direction traveled (east or west), and individual susceptibility (some people are more severely affected than others). For example, you may not notice any symptoms after crossing 1 or 2 time zones, but you will certainly have some jet lag after crossing 12 time zones.

Jet lag does not occur if you stay within the same time zone because you do not need to readjust your biologic clock. However, other unpleasant consequences of travel can still occur such as dehydration, stress, and muscle soreness/stiffness.

WHAT ARE THE EFFECTS OF JET LAG ON HUMAN PERFORMANCE?

Jet lag often causes sleep deprivation and circadian rhythm (body clock) disruption. These, in turn, may lead to adverse consequences that may affect athletic ability such as:

- prolonged reaction time
- decreased short term memory
- decreased concentration
- reductions in anaerobic power and capacity
- increased accident and injury rates
- reduced dynamic strength
- decreased alertness
- cognitive slowing

The degree of these consequences ranges from imperceptible to very significant. With such a narrow margin of victory in today's competitive sports, it makes sense for athletes, coaches, and athletic trainers to consider jet lag's potential effects on performance.

DO I NEED TO KEEP READING THIS BROCHURE?

You should learn more about jet lag and its treatment if:

- you are interested in optimizing performance, or
- you are traveling by airplane across more than 2-3 time zones, or
- you have had problems with jet lag in the past.

IS JET LAG DANGEROUS?

Not really, but jet lag often includes excessive sleepiness and many studies have shown that humans are at greater risk for accidents and injuries when sleepy. Many automobile accidents in the US are related to sleepiness/fatigue each year. Please be careful when traveling or changing your sleep patterns. Drive only when you are fully alert. Avoid alcohol when you are sleepy, it may make your sleepiness worse.

HOW IS JET LAG TREATED?

A considerable amount of inaccurate information has been written on jet lag. Suggested treatments have included everything from strict dietary recommendations to potentially harmful advice which could worsen the symptoms of jet lag.

A rule of thumb states that it takes one day for the body clock to adjust to each time zone you cross. Complete readjustment to a trip from the States to Europe often takes 6-10 days. Luckily, we can shorten this adjustment process through our understanding of the body clock's physiology.

In general, jet lag is treated by gradually shifting the sleep/wake cycle (bedtime and wake-up time) and by exposure to bright light at certain times of the day. The details of this treatment are determined by the direction of travel (east or west) and the number of time zones crossed. The general jet lag guidelines presented below have been simplified for ease-of-use. If you need more detailed guidelines please contact those people listed at the end of this document.

CAN MEDICATIONS OR SUPPLEMENTS HELP MY SLEEP AND JET LAG SYMPTOMS?

Medications or supplements can help sleep, but none have been approved for jet lag. If you are considering the use of a sleep aid, keep the following in mind:

- Check with the United States Anti-Doping Agency regarding policies on medications or supplements prior to use. Call the USADA drug reference line at 1-800-233-0393 or visit their website at www.usantidoping.org for more information.
- Check with your physician or pharmacist regarding potential side effects.
- Some medications or supplements may worsen the symptoms of jet lag if taken at the wrong time.

HOW ABOUT MELATONIN?

Melatonin is a neurohormone that is not regulated/tested by the FDA. Some studies suggest that it helps with jet lag, but research is not conclusive. Some of the risks of taking melatonin include a risk of blood clotting, increased risk of seizure, mood changes, decrease in blood pressure, and disorientation. Check with the USOC regarding policies on medications or supplements prior to use.

HOW ABOUT CAFFEINE?

Most athletes, coaches and athletic trainers have heard about the performance-enhancing debates regarding caffeine. Obviously, you need to check the USOC's policies on caffeine prior to use. Caffeine acts as a mild stimulant and in smaller amounts has been shown to decrease sleepiness. Try to avoid the use of caffeine close to bed time as it can disturb your sleep.

OK, WHAT GENERAL GUIDELINES CAN I FOLLOW TO REDUCE JET LAG?

Follow these steps for help in dealing with jet lag and common travel-related problems:

Step 1: Read the General Travel Tips (table 1)

Step 2: Read the Light Exposure and Shifting Your Sleep/Wake Cycle sections (tables 2 and 3)

Step 3: Find the time zone change paragraph that best fits your trip in the Guidelines section (table 4)

TABLE 1

GENERAL TRAVEL TIPS

Some unpleasant feelings are blamed on jet lag but are really due to other things. Dehydration, physical inactivity, noise, hunger and stress frequently occur with long distance travel and often cause the traveler to feel poorly. Anticipating and addressing these problems may make your trip more enjoyable and successful. Let's look at how you can avoid these problems:

- **DEHYDRATION** - Many people do not consume enough fluids when they are traveling and they become mildly dehydrated. Dehydration can make people feel lightheaded, dizzy, sick to their stomach, and can cause headaches and constipation, etc. To avoid this situation, drink adequate amounts of non-caffeinated, alcohol-free beverages such as fruit juice, fluid replacement drinks and water.
- **INACTIVITY** - A lack of physical movement or activity frequently accompanies air travel. This decreased activity can produce muscle and joint stiffness, backaches, etc. Regular physical activity counteracts these problems and even helps our immune system function properly. Try to get up and stretch or walk at least every 2 hours.
- **STRESS** - Traveling is often stressful, and stress can cause all kinds of trouble! Muscle tension, irritability, anxiety, headaches, stomachaches, insomnia, etc., can be signs of stress. There are many books and professionals available to advise you on the topic of stress reduction and coping skills. In general, after you recognize the signs of stress, reduce the stress with something that you find relaxing.
- **NOISE** - Noise can disturb your sleep (without you even knowing about it) and noise can increase your stress level. One of the best travel investments known to humankind is a set of foam ear plugs. The foam ear plugs you can get from your local hardware store cost about a dollar, and can be used many times. They are even easy to sleep with.
- **DIET** - Finding food of sufficient quality and quantity when you are traveling can be difficult. Try to carry some of your favorite portable foods with you. Some version of an energy bar is a decent choice as it travels well and gives you a variety of nutrients.
- **NAPPING** - Brief naps (no longer than about 15-20 mins) can decrease sleepiness, improve performance, and induce a sense of well being ("that nap felt good"). Longer naps, on the other hand, can confuse the body clock and can produce the opposite effect.

Be sure to test any major changes in your travel strategy prior to implementing them on your next important trip.

TABLE 2

LIGHT EXPOSURE

Light exposure is arguably the most powerful tool we have for readjusting the body clock. There is a direct neurologic connection from the eye to the body clock which allows light to adjust the clock every day. We can use this physiologic knowledge to readjust the clock more quickly.

Obviously, you should never look directly into a light source because you may hurt your eyes. Simply being outside (even on a cloudy day), or in a brightly lit room is usually enough light exposure. The timing of the light exposure is important so try to follow the specific directions for each travel situation noted in the Guidelines table. This may sound obvious, but it is also important; it should be light when you want to be awake, and dark when you want to sleep.

TABLE 3

SHIFTING THE SLEEP/WAKE CYCLE

The body clock can't make large time changes rapidly, but it can handle small changes slowly. Therefore, if you start shifting your sleep/wake cycle (bedtimes and wake-up times) a few days before you leave and finish shifting the first few days after you arrive, the effects of jet lag will be reduced or eliminated.

FOR EXAMPLE: Let's say your usual bedtime (BT) and wake-up time (WT) is 11pm and 7am respectively.

If the Guideline table says: "Prior to leaving, gradually shift your BT and WT 2-3 hours later than usual."

It means: A couple of days before you leave, gradually go to sleep a little later and wake up a little later each day so that by the time you leave, your bedtime is about 1am and your wake-up time is about 9am.

If the Guideline table says: "Upon arrival, start with a BT and WT 2-3 hours earlier than usual and gradually shift towards your usual BT and WT."

It means: When you arrive at your final destination, go to bed around 9pm and wake up around 5am, and over the next few days gradually go to sleep a little later and wake up a little later each day so that you reach your usual BT and WT of 11pm-7am in a couple days.

Note: It is less important but still helpful to shift your other daily activities (meals, exercise, etc.) in the same general direction.

TABLE 4

GUIDELINES

Find the time zone change and direction of travel that best fits your trip and follow the guidelines. Refer to tables 2 and 3 for more information if needed.

0-2 time zones, East or West

- Jet lag is rarely problematic with these trips, therefore no specific recommendations are provided.
- However, be sure to read the General Travel Tips (table 1).

3-5 time zones West³

- Jet lag is often present with these trips.
- Read the General Travel Tips (table 1).
- Prior to leaving, gradually shift your BT and WT 1-2 hours later than usual. A couple of days before you leave, get light exposure for at least 30 minutes sometime in the 2 hours before you go to bed.
- Upon arrival, start with a BT and WT 1-2 hours earlier than usual and gradually shift towards your usual BT and WT. Get light exposure for at least 30 minutes sometime in the 2 hours before you go to bed for the first couple of days.

3-5 time zones East

- Jet lag is often present with these trips.
- Read the General Travel Tips (table 1).
- Prior to leaving, gradually shift your BT and WT 1-2 hours earlier than usual. A couple of days before you leave, get light exposure for about 30 minutes when you first get up in the morning.
- Upon arrival, start with a BT and WT 1-2 hours later than usual and gradually shift towards your usual BT and WT. Try to get light exposure for about 30 minutes when you first get up in the morning for the first couple of days.

6-8 time zones West⁴

- Jet lag is almost always present with these trips and is of moderate intensity.
- Read the General Travel Tips (table 1).
- Prior to leaving, gradually shift your BT and WT 2-3 hours later than usual. For a few days before you leave, get light exposure for at least 30 minutes sometime in the 2 hours before you go to bed.
- Upon arrival, start with a BT and WT 2-3 hours earlier than usual and gradually shift towards your usual BT and WT. Get light exposure for at least 30 minutes sometime in the 2 hours before you go to bed for the first few days.

6-8 time zones East¹

- Jet lag is of moderate to severe intensity.
- Read the General Travel Tips (table 1).
- Prior to leaving, gradually shift your BT and WT 2-3 hours earlier than usual. For a few days before you leave, get light exposure for about 30 minutes when you first get up in the morning.
- Upon arrival, start with a BT and WT 2-3 hours later than usual and gradually shift towards your usual BT and WT. Try to get light exposure for about 30 minutes when you first get up in the morning for the first few days.

9-12 time zones West^{1,2}

- Jet lag is of moderate to severe intensity.
- Read the General Travel Tips (table 1).
- Prior to leaving, gradually shift your BT and WT at least 3 hours later than usual. For at least a few days before you leave, get light exposure for at least 30 minutes sometime in the 2 hours before you go to bed.
- Upon arrival, start with a BT and WT at least 3 hours earlier than usual and gradually shift towards your usual BT and WT. Get light exposure for at least 30 minutes sometime in the 2 hours before you go to bed for at least the first few days.

9-12 time zones East^{1,2}

- Jet lag is of moderate to severe intensity.
- Read the General Travel Tips (table 1).
- Prior to leaving, gradually shift your BT and WT at least 3 hours later than usual. For at least a few days before you leave, get light exposure for at least 30 minutes sometime in the 2 hours before you go to bed.
- Upon arrival, start with a BT and WT at least 3 hours earlier than usual and gradually shift towards your usual BT and WT. Get light exposure, for at least 30 minutes sometime in the 2 hours before you go to bed for at least the first few days.

Footnotes

- 1 - Important: Do not expect to be performing, coaching, training, etc., at your best for the first 1-2 days after these trips. Give your body a chance to acclimate to the new time zone.
- 2 - You may notice that the “9-12 time zone East” and “9-12 time zone West” guidelines are the same. This is because the body clock will essentially shift in the same direction for either trip.
- 3 - For example: from Honolulu, Hawaii to Sydney, Australia.
- 4 - For example: from San Francisco, California to Sydney, Australia.

All guidelines are relative to local time. Adjust your watch to the new time zone on the airplane.

HOW CAN I LEARN MORE ABOUT JET LAG AND MY SLEEP?

A document entitled *Jet Lag Countermeasures and Travel Strategies, Detailed Report* is available from the USOC. It reviews the physiology and science behind the information in this brochure.

HOW CAN I GET MORE SPECIFIC JET LAG COUNTERMEASURES?

Roger S. Smith, D.O., Stanford University trained, Board Certified Sleep Medicine physician, is available to provide more detailed jet lag guidelines or answer other sleep-related questions.

Contact the USOC Coaching and Sport Sciences Division at 719-866-4516 for additional information.

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