



HOW TO BEAT JET LAG

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Introduction

"Jet lag" is a problem experienced after travelling long distances. Research shows the "competitive edge" can be lost after crossing as few as one or two time zones. Jet lag problems multiply as more time zones are crossed.

This booklet outlines steps taken in advance of travel to reduce effects of jet lag. The recommendations are based upon both research and experience. We cannot guarantee you a medal if you follow the steps, but we do promise they will help reduce the effects of jet lag and help you perform your best.

What Is Jet Lag?

"Jet lag" is the mental and physical effects caused by travelling across time zones and results from disruption of bodily rhythms and the sleep-wake cycle. Changes in these result in digestive problems, headaches, and variations in endocrine hormone release, blood pressure, heart rate, breathing patterns, oxygen use, and bowel habits, as well as symptoms of fatigue. Any can cause decreased physical energy and reduced performance ability.

Why Is Jet Lag Of Particular Concern?

The farther the trip, the more likely one is to experience jet lag, the worse it will be, and the longer it will last. Not only is the long travel time aboard an airplane stressful, but crossing time zones is an additional factor. It is virtually impossible to travel this far without feeling some effects of jet lag.

What Can I Do To Avoid Jet Lag?

Everyone has an internal "biological clock" guiding daily life. This clock prepares the digestive system to receive food at normal times and causes production of digestive juices even before we smell food. It also helps regulate energy, strength, and alertness, and causes one to become tired at about the same time each evening.

Important steps to reduce jet lag involve adjustment of time cues, or "zeitgebers" (pronounced "tseitgayburs"). "Zeitgebers" are activities and inputs which help the body interpret its environment, determine whether it is day or night, and decide what activities (including conscious, unconscious, and biochemical activities) are appropriate for the time. Major zeitgebers are diet, light, exercise, drugs, and social interaction. Adjustments of these cues before and during travel help the body re-set its internal clock more quickly and easily.

The body's sense of time is affected by internal and external factors. The biological clock is coordinated by hormones, produced by endocrine glands in varying amounts and kinds throughout the day. Hormones help determine alertness, muscle proficiency, and mood, and their interplay with external time cues determine how strong the body clock's signals will be.

I Have Heard That Diet Is Very Important To Reducing Jet Lag. Is This True?

Yes, diet is considered very important. Timing and content of meals are both essential to help the body adjust to time changes.

Why Does Adjusting The Diet Help Reduce The Effects Of Jet Lag?

Different foods cause different bodily reactions and can affect whether we feel sleepy or awake. Starchy and sweet foods provide quick but transient energy. They stimulate the indoleamine metabolic pathway and encourage higher concentrations of tryptophan, an essential amino acid, to enter the brain and be converted to sleep-inducing serotonin. As serotonin levels rise, sleep comes more readily. Thus, starchy and sweet foods, ultimately, tend to make one feel lethargic and can aid in sleep.

High protein foods on the other hand, help stimulate the "get-up-and-go" catecholamine pathway (adrenaline pathway, starting from the amino acid tyrosine and resulting in the synthesis of the neurotransmitters dopamine, norepinephrine, and epinephrine) and tend to make us more alert.

Thus, what and when one eats helps the biological clock function. Many recommended changes involve diet adjustments prior to and during travel. A "Feast-Fast" program to help re-set the body's clock is described. On "Feast" days, you eat more calories than you burn. On "Fast" days, you eat fewer calories than your body needs. Adjustments triggered by diet help your body adapt to travel across time zones, by contributing, along with other zeitgebers, to shift the biological clock from home time to destination time.

How Do Other Zeitgebers Affect The Biological Clock?

Other major zeitgebers are light, exercise, drugs, and social interactions. They affect the body as follows.

Light - Light signals move swiftly from the eyes to the brain and stimulate a series of hormones to help one either awaken or go to sleep. When not travelling across time zones, your body is stabilized by bright light in the active day phase and darkness during the rest night phase.



HOW TO BEAT JET LAG

Exercise - Physical activity tends to stimulate the body and make it more alert. Therefore, strenuous physical exercise reinforces the body clock early in the day but works against it at night.

Social Interaction - Social contact is individual but can include talking, shopping, and watching television. It tends to excite a person and make him/her feel awake. Thus, it is best used during the active phase and restricted during the rest phase.

Drugs - Like food, other chemicals put into the body can affect performance. Some drugs, such as caffeine, are so commonly consumed they are considered "foods". Drugs and medications can alter the biological clock significantly.

When Should I Begin To Try To Re-set My Body's Biological Clock?

Begin to alter your schedule three days before travel. Daily recommendations are outlined below. Schedule alterations prior to departure do not vary for travel west to east or east to west.

What Specific Steps Should I Take?

Following these steps will help reduce jet lag.

THREE DAYS BEFORE TRAVEL

This is the first day of your program. It is a FEAST day. Eat more than you normally eat and get as much sunshine as possible, especially early morning and early evening.

- **BREAKFAST AND LUNCH** Eat large quantities of high protein foods (meat, eggs, fish, poultry, cheese, and tofu), and as many vegetables as you want. Cut back, but do not eliminate starches. Sweets (candy, cake, sugary soft drinks, pie, etc.) should be eliminated for these meals but can be used at "tea time". Drink unlimited quantities of decaffeinated beverages but eliminate caffeine except at tea time. Do not consume chocolates or cocoa until tea time, since they contain caffeine. If you usually drink caffeine-containing beverages in the morning, substitute a brisk walk upon waking.

- **SNACKS** before 5:00 p.m. should be high in protein, low in sugar and carbohydrates, and not contain caffeine. If you use a sugary drink during training, substitute unsweetened fruit juice. It provides calories, and your body can handle the natural sugar more easily than refined sugar.

THREE DAYS BEFORE TRAVEL - (continued)

- **TEA TIME** (3-5 p.m.) Switch from high protein to high carbohydrate foods and beverages. Caffeine and sweets are permitted, but not required, at this time. It is important for resetting your body clock to restrict caffeine intake to only the interval between 3-5 p.m., eat high protein foods prior to this and high carbohydrate foods afterwards.
- **SUPPER** should be high in carbohydrate and low in protein, the reverse of breakfast and lunch. Eating a starchy supper stimulates hormones aiding sleep. Bread, pasta, and rice are all good foods for this meal.
- **SNACKS** eaten after supper should be high in carbohydrates, low in protein, and should not contain caffeine.
- On this day, go to bed at your usual time but avoid any sleep deprivation. Be sure to get a minimum of 7 1/2 hours of sleep.

TWO DAYS BEFORE TRAVEL

- This is a **FAST** day, during which you eat fewer calories than usual. The content of meals is the same as the previous day but limit caloric intake to a fraction of what you ate the day before.

Continue the pattern of high protein breakfast and lunch (no caffeine), and high carbohydrate dinner, but eat skimpier portions. At tea time, you can still have caffeine but reduce sweets. Snacks during the day should consist of low calorie, high protein foods (for example, chicken soup with chunks of meat but no noodles). No evening snacks are permitted.

- If you are training, do not reduce your caloric intake too low. If you usually burn 2500 calories a day, do not fall below this level.
- Again, follow your usual sleep schedule, and avoid any sleep deprivation (get a minimum of 7 1/2 hours sleep).



HOW TO BEAT JET LAG

ONE DAY BEFORE TRAVEL

- This is another FEAST day. Follow the directions for day one.
- You will likely be running around making last minute preparations. This will stimulate you, so do this early in the day. If you do not have a travel kit, prepare one early in the day. You may also want to prepare a high protein "picnic" for the flight. It will supplement food provided on the plane and may be your first meal on your new time. Remember travel kit foods must either not need refrigeration or be eaten before they spoil. These foods are intended "for emergency use"; the airline will usually try to accommodate your schedule if you ask them.
- On this evening say your goodbyes to friends and family, since you will have many other things to keep you busy on the travel day. You may want to remain awake a bit later than usual - feel free to do this.

Delaying sleep activity helps adjust your biological clock. However, avoid sleep deprivation, and get a minimum of 7 1/2 hours sleep.

TRAVEL DAY - WEST TO EAST

- If your schedule allows it, sleep in. Try to get up to 8-9 hours of sleep.
- If you use caffeine, drink 2-3 cups of a strong caffeinated beverage immediately upon awakening (before 11 a.m.), but do not take in any more caffeine, if possible, for the rest of the day. The caffeine "jolt" in the morning will push your body in the right direction.
- The morning is a FAST day, and you will end this fast with a large high protein breakfast on destination time. Until then, follow recommendations for day two for this morning, eating a small high-protein breakfast.
- If you can, take a nap after breakfast, and keep your activity to a minimum throughout the day. Avoid the morning sunlight as much as possible. When you depart from your home city, feel free to sleep on the plane, and do not drink caffeine-containing beverages.

TRAVEL DAY - WEST TO EAST (continued)

- **IF YOU TRAIN** before departing, have a late, low calorie, high protein breakfast of just enough calories to get you through the workout. If possible, reduce your workout schedule this day and cut back your calories accordingly; be careful, however, not to cut back calories to the point that you feel weak. **IF YOU DO NOT TRAIN**, remember you are burning calories like a non-athlete, so consume a very skimpy, high protein, low calorie breakfast.
- **AFTER BREAKFAST** do not eat again until breakfast time in your destination city. Physical activity on this day should be kept to a minimum.
- It is suggested you put on two watches. Set one to destination time and one to home time. Use the watch for home time until you get on the plane to the destination city, but begin to think about what you would be doing if you were already on the destination time. Once you get on the plane, use the watch set to the destination time, and take off the watch set to home time.
- Remember to carry your in-flight "travel bag" with you.

RECOMMENDED CONTENTS OF IN-FLIGHT TRAVEL BAG

Essential Toiletries
(toothbrush, toothpaste, razor, small hand towel, lotion, etc.).

High-protein snacks
(small package of cheese and crackers, hard-boiled egg (s), low-sugar granola bars, peanut butter, nuts)

Eye mask or blindfold

Ear plugs

Light-weight slippers

Book, cards, other items to entertain you during walking hours.

- Arrive at the airport early to avoid the rush. If sleeping is a normal activity on destination time, feel free to nap while waiting in the airport.



HOW TO BEAT JET LAG

TRAVEL DAY - WEST TO EAST (continued)

- Continue to fast until breakfast time in the destination city, and then, even if you are still in flight, break the fast with breakfast eaten on destination time. This large high-protein breakfast begins a FEAST day, and represents the start of eating all your meals on destination time.
- If you arrive during the day, rest as much as possible on the plane. Grab a blanket and pillow, put on your blindfold, and insert your ear plugs to simulate night. Loosen restrictive clothing, or change into comfortable clothing, if possible.
- If it is night when you arrive, stay awake as much as possible on the plane. This helps you to be ready to sleep following your arrival.
- When your watch tells you it is time to be awake on destination time, get up and move around. Take your travel kit to the toilet and wash your face, brush your teeth, etc.; that is, perform your usual morning rituals as much as possible. Interact with people to stimulate your body. If possible, walk up and down the aisle, and do simple isometric or stretching exercises.
- At breakfast and/or lunch time in the destination city, have high protein, high calorie meals. This helps push your body's biochemistry into its new time frame. Eat the high protein picnic you brought with you if the airline doesn't serve appropriate foods at appropriate times. Do not worry if the foods look more like a dinner or snack; your body sees it as a source of protein. If eating the meal supplied by the airline, eat only the protein portions and ignore starches and sweets. Supplement this meal with your picnic. If you arrive in the destination city in time for lunch, you may eat most of your picnic at this time; but keep some food in reserve in case you are detained by airport security. Be sure that, according to the destination city time, you eat a high protein lunch on this day.
- During the flight, drink plenty of fluids, avoiding alcohol and caffeinated beverages. Humidity in jet cabins is very low, so liquid intake is important to avoid dehydration. Alcohol and caffeinated beverages are diuretics which cause the body to eliminate fluid. Water and fruit juices are the best fluids to drink.
- Avoid smoking. When one smokes, large amounts of carbon monoxide are ingested. This can increase any effects of oxygen deficiency which can occur when flying at high altitudes. Sit as far away from the smoking section of the aircraft as possible.

ARRIVAL DAY - AFTER LANDING

- Have a large, high protein, low carbohydrate lunch on destination city time, if you arrive during the day. Feel free to resume normal training or attend orientation lectures after arrival.
- If you arrive in the evening, have a high carbohydrate dinner. This will help you sleep better.
- Adopt the local time for training, eating, and sleeping schedules.
- Do not attempt a difficult workout on arrival day, but a light workout is okay if you arrive during daylight hours. For your first heavy workout, wait a day or two to allow recovery from the slight sleep deprivation you experienced during travel.
- During late afternoon and early evening following arrival in the destination city (or on your first full day if you arrive at night), get as much sunshine as possible. Light is a strong time cue, and you should strive to be exposed to it in late afternoon and early evening to help anchor your body onto the destination city time frame. Try your best to adjust your senses to the new time zone; this is especially important on your first day.
- Do not nap on your arrival day (unless you arrive in the evening, then you should go to bed at your usual time), and do not use caffeine. Both naps and caffeine can reverse the adjustments you have made to your body clock.
- Again, be sure to have a high carbohydrate supper this evening. After you arrive, unpack your nighttime-routine paraphernalia and continue, on destination city time, your usual nighttime routine at your usual hour.
- Have quiet, dark, and comfortable sleeping quarters. You will be excited and stimulated to be in a new country, but try to get a good night's sleep.

SUBSEQUENT DAYS

- Start the next day with a high protein breakfast and sunshine. Sunshine gives your body an extra cue to help it adjust to the new time more quickly.
- At this point, feel free to return to your usual training diet.



SUBSEQUENT DAYS - (continued)

Many people report they feel better with the morning-protein, evening-carbohydrate diet, and opt to continue this pattern. The decision is yours according to what feels best for you.

- Avoid naps until you are fully adjusted to the new time schedule.
- Get up at the same time every morning, and try to go to bed at the same time each night.
- Get sunshine throughout the day, especially the morning and early evening. This will provide a "framework" light-dark cycle to help your body maintain its circadian cycle in the switch from daytime to evening hormones.

What If I Am Taking Prescription Drugs?

If you are taking medications prescribed by a physician, consult the physician prior to travelling. Explain your travel plans, including how many time zones you will be crossing, activities you will be participating in, and dietary changes and other anti-jet lag steps you plan to follow. Only your physician can help you to plan a proper medication schedule.

What About Alcohol, Non-Prescription Drugs, or Illicit Drugs?

As a general rule, if a substance picks you up or takes you down, it has a negative effect on the body's time-keeping system and can potentially harm your performance. Alcohol dehydrates the body and should be avoided during both travel and training.

Also, remember many drugs and other substances are banned by the International Olympic Committee, and you may be subject to drug testing. Do not take any medication or other substance without checking with the team physician first. If caught using a banned substance, you will be disqualified from competition and forfeit any medals won.

Further, if caught using illicit drugs, you will be violating laws and may be subject to arrest.

What If I Cannot Sleep After I Arrive?

If you cannot sleep and have to compete the next day, go to bed and try to rest. Performance will suffer if you do not rest. Even if you are not sleeping, your body is resting when you lie quietly.

If you do not have to compete the next day and want to get up, go ahead and get up but go into another room or area. Stay up until you are sleepy, then return to bed. Do this as often as necessary throughout the night.

Other general tips to help relieve insomnia:

- Do not lie down in the bed at night if you are not sleepy.
- Do not read or watch television in bed, since activities may stimulate you.
- Get up at the same time each day, no matter how much sleep you got.
- Do not nap during the day.
- Eat a high carbohydrate snack before bedtime.

TRAVEL EAST TO WEST

- For the three days prior to departure, follow instructions for the three days prior travel east to west, alternating feast and fast days in the same pattern. The last feast day should be the day before your departure flight.
- On your flight day, get up as early as possible, and eat as little as possible. This is a fast day. You should avoid caffeine prior to departure.
- Put on your two watches. One is set to present time, and the other to the time in your home city.
- In the early part of the day, stay as active as possible. Check into the airport prior to 5:00 p.m., so you need not rush when you would normally be sleeping in the present city. Around 6:00 p.m. present time (and no later than 11:00 p.m.), drink 2-3 cups of strong caffeinated beverage. From this time on, function according to home time.
- During flight, grab a blanket and pillow and try to sleep until time for breakfast at your home time.



HOW TO BEAT JET LAG

- Spend as much time as possible on the plane sleeping, and avoid any stimulation (movie, alcohol, caffeine). Arrange to break your fast with breakfast on home time, even if still in flight.
- About an hour before breakfast on home time, begin to activate your body's wake-up pathways by performing your usual morning routines to the extent possible. Do not drink any caffeine for the rest of the day. Eat a large, high protein, low carbohydrate breakfast on your home schedule.
- Eat a high calorie, high protein lunch according to your home time, and a high calorie, high carbohydrate supper. Do not use any more caffeine-containing beverages and do not snack after supper.
- To avoid sleep deprivation, go to bed early (no later than 10:00 p.m. on home time). You may have difficulty going to bed, but in the long run you will benefit from trying to get a good night's sleep.
- On the day after you arrive home, eat a large, high protein breakfast. Get as much sunshine as possible on this day, particularly during the morning.
- Try to resume your usual schedule. Do not nap; try to stick it out and go to bed after dark, as close to your usual time as possible.

A Word About Your Circadian Performance Acrophase . . .

People are at their best at certain times of the day, varying from one individual to another. For athletes, it is ideal to compete at this time of the day, because you are most likely to perform your best. The time of day you perform best is known as the "circadian acrophase for peak performance".

For most people, the best time is the broad arc-of-the-day. One person may be better earlier in the day and one person later, but nearly everyone is at their worst either very early or very late each day. So, if you perform best at noon but you must compete at 8:00 p.m., you may want to try to help remove the potential handicap of competing at a time other than your best.

It is possible to do this. With an 8 hour phase difference, for example, you may want to arrange phase-shifted meal scheduling. This means sleeping your usual uninterrupted 7 1/2-8 1/2 hours, rising at 11 a.m., having breakfast at noon, and so on throughout each phase-shifted day. You will have to go to bed at a decent "early" hour (leave 15-16 active hours each day), but try to match your phases so that your competition schedule is in concert with your peak performance acrophase.