



DAS/HUM

## Fatigue and Sleep Management

Personal strategies for decreasing the effects  
of fatigue in air traffic control

# HUMAS





*For shift workers, fatigue and sleep debt can become a challenge and difficult to cope with. We have designed this booklet to provide knowledge and strategies that you can use to manage your lifestyle, in order to help you better manage your sleep.*

*When reading through this booklet keep in mind that whilst some of the ideas/suggestions may seem a little eccentric, people are different, and something that may work for one person may not work for another. Find what works for you, then you will be one step closer of getting a good nights sleep and feeling less tired.*

*Sweet dreams!*

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# GENERAL INTRODUCTION TO FATIGUE, SLEEP AND SHIFT WORK

Fatigue among Air Traffic Controllers (ATCOs) originates from various sources. Roske-Hofstrand (1995), has categorized types of fatigue mentioned by ATCOs: (15)

- physical - related to lack of sleep and sluggishness at start of a shift
- shift/schedules related fatigue
- end of shift and workload fatigue - related to high and low workload, and time on duty
- emotional stress - lack of sleep related to problems with supervisors, co-workers, etc.

Not all authors would agree on this typology; still, a lot of attention has been focussed on fatigue caused by: (15)

- shift work
- schedules
- workload
- time on task
- factors influencing resistance and vulnerability to fatigue.

Some lifestyle elements have been shown to influence how a person deals with fatigue. For example;

ATCOs who have healthy habits such as exercising, a balanced diet, good sleep hygiene, and good time management strategies cope more effectively with fatigue. It also seems that physical fitness reduces fatigue and increases performance on night shifts. In contrast, ATC who smoke, who drink too much alcohol and coffee, and who take medication to go to sleep show more illness indicators. Additionally, coping with shift work, fatigue, and stress becomes increasingly difficult with age, mainly because older ATCOs are less resistant to stress, get less sleep, and their circadian rhythms are more easily disrupted by unstable sleep patterns (15)

Whether ATCOs are morning or evening types can influence performance and adaptation to shifts:

- Morning types prefer to get up early and go to bed early at night, while evening types prefer the opposite.
- Accordingly, morning-type ATCOs have more difficulty coping with night work, but they cope more easily with early morning hours, while evening types, as can be expected, cope more easily with evening and night shifts.
- Overall, evening types cope better with shift work since they show less sleep disruption with shift work and also lowered levels in physiological indicators associated with stress.

The following table show us the effects of fatigue and sleep loss on performance.

Performance Category	Effects
Reaction time: Increased	Timing errors in response sequences Required enhanced stimuli
Attention: Reduced	Overlook/misplace sequential task elements Preoccupation with single tasks or elements Reduced audiovisual scan Less aware of poor performance
Memory: Diminished	Inaccurate recall of operational events Forget peripheral tasks Refer to "old" habits
Mood: Withdrawn	Less likely to converse Less likely to perform low-demand tasks More distracted by discomfort More irritable "Don't care" attitude

Adapted from: "Aircrew Fatigue and Circadian Rhymicity" by Graeber RC in "Human Factors in Aviation" by Wiener and Nagel (17)

# CIRCADIAN RHYTHMS AND SLEEP PATTERNS

## CIRCADIAN RHYTHMS

Circadian rhythms are the natural daily rhythms that govern our daily lives. The circadian clock, located in the suprachiasmatic nucleus of the hypothalamus, regulates daily variations in numerous physiological processes such as sleep/wakefulness, temperature, and hormone release, as well as cognitive performance. (16)

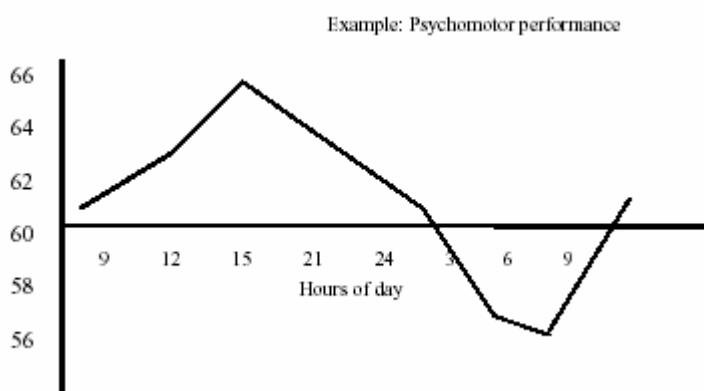
A daily trough in body temperature occurs about 1.5-2 hr before the usual wake time. This is close to the time of a daily trough in alertness and cognitive performance. Thus, the circadian clock is programming the body for maximal sleepiness in the early morning hours (about 0300-0500 for a person on a typical sleep/wake schedule). There is a second period of increased sleepiness that occurs in the mid-afternoon, regardless of whether lunch was eaten. (16)

A human allowed to live in an environment free of time cues (i.e., no external light/dark cycle or clocks) will extend the usual 24-hr day to a longer period, closer to about 25 hr. (16) This extension is probably due, at least in part, to the natural internal tendency of the circadian clock to run with a cycle length that is slightly longer than 24 hr. This basic physiological property of the clock explains the relative ease of staying up later (i.e., lengthening the day) and the relative difficulty of trying to initiate sleep earlier than usual (i.e., shortening the day). Lengthening the day is called a phase delay, while shortening it is called a phase advance. (16)

Ordinarily the clock is synchronized to the 24-hr day by the daily alteration in light and darkness. Problems can arise because the circadian clock cannot adjust immediately to an abrupt change in the timing of the light/dark or sleep/wake schedule, as in shift work. When humans move to a new time zone or change their shift schedule (e.g., work at night and

sleep during the day), the internal circadian clock can take from days to weeks to adapt physiologically to the new schedule. (16) Manipulation of bright light can facilitate this adaptation. Anytime there is a lack of light cues to keep the clock synchronized, it will tend to move toward its natural, longer than 24-hr rhythm. (16)

Personal vigilance is related to the body's circadian rhythms rising from a low level early in the morning, peaking during the day and then falling again. Unfortunately ATS officers must provide service throughout the 24-hour cycle, and often perform their critical tasks when their ability to be vigilant is lowest. Graph 1 represents the typical change in performance for a task over a period of 24 hours. (17)



## SLEEP PATTERNS

**What are the types of problems to expect with extended sleep deprivation? (16)**

### **A – What causes sleepiness? (16)**

People who lose sleep not only become sleepy but also have to make a substantial effort to avoid unwanted sleep onsets.

It is easy to underestimate the magnitude of the drive for sleep after an extended period without any. Sensitive laboratory measures show that, after two days without sleep, subjects will fall asleep immediately (i.e., in less than 2 min) in a sleep-conducive environment.

Such an environment is more likely to be found in a information centre than on the flight deck, and consequently, many of the people doing the

planning and other "desk work" are at greater risk to fall asleep on the job than those who are more physically active.

Factors that promote the onset of sleep are:

- Warm temperature
- Reduced social stimulation & interaction
- Dim lighting
- Minimal physical activity
- Low noise levels
- Passive, monitoring-type work

However, if there is a lull in physical activity, even persons with active job demands can fall asleep quickly after 24 hr of wakefulness.

## **B – What are the physical and mental effects of sleep deprivation?** (16)

The problems resulting from sleep loss are pervasive and insidious, affecting virtually all aspects of performance.

- Microsleeps are more likely to occur. These are brief (several seconds or less) episodes of total perceptual disengagement from the environment. Microsleeps can occur during periods of otherwise acceptable performance. Consequently, performance tends to become more variable and uneven -- people perform well for periods of time with brief lapses, errors, and other performance failures interspersed.
- Lapses are failures to respond to information, or failures to respond in a timely manner. There is also a general tendency toward slower performance, resulting in longer reaction time. The tendency to experience microsleeps, lapses, and slower reaction times combine to result in reduced vigilance.
- Short-term memory can become impaired. That is, newly learned information becomes difficult to store and retrieve from memory. Fixation on a particular task or component of a task can also occur, resulting in failures to perceive and process other possibly critical information.
- Communication often becomes reduced in amount and effectiveness.
- Decision-making can be impaired, with people showing a tendency to choose options that involve less effort, even though they have a known lowered probability of success.
- There can be a general loss of situational awareness in all environments. In general, the performance problems described above

are more likely to occur on novel or higher-level cognitive tasks, while well learned tasks are more resistant to the effects of sleep loss.

## **C – How does sleep loss effect behaviour (16)**

### **Giving up speed for accuracy**

The nature of the performance difficulty can depend on the type of task. On tasks where people can proceed at their own pace, there is a marked tendency to slow down in order to maintain accuracy. This occurs despite explicit instructions and attempts to work as quickly as possible.

### **Sacrificing routine maintenance**

When sleep deprived there is a general tendency to change how one allocates limited mental and physical resources.

In the operational environment this tendency often can result in shedding maintenance and other routine tasks in order to perform one's primary task. This is a particular problem for those working with complex systems or systems requiring maintenance during the period of sleep deprivation.

### **Degraded mood**

There is a general degradation of mood with sleep deprivation. While there is a tendency to dismiss this outcome, mood is undeniably important to morale and to effective crew communication and resource management.

### **Reduced motivation**

People can function physically when sleep deprived but will want to quit earlier due to feeling that they do not have the energy to continue. There is a marked reduction in motivation. The sleep loss itself tends to become the predominant theme. People change their behaviour as a result. Among other things, they eat less and may need to be encouraged to obtain meals and look after their own basic needs. Nevertheless, effort increases at the same time that motivation (i.e., desire to continue) and performance both drop. One keeps trying to do a task if asked or required, even though one does not want to continue.

In order to keep going a greater compensatory effort is expended. This effort is often accompanied by a reduced ability to control what is happening in the environment and so can lead to anger, frustration, emotional outbursts, and cutting corners to conserve energy.

These performance decrements will increase despite increasing compensatory effort on the part of motivated individuals.

# SHIFT WORK - A BETTER UNDERSTANDING

In the literature on air traffic control some attention has focussed on how shift work and work schedules result in fatigue, and on how they affect performance, sleep, mood, and health. (15)

Authors investigating fatigue among ATCOs find that fatigue related to shift work is twofold: (15)

- 1) ATCOs working at night are at the lowest point in their circadian rhythms, which results in fatigue, sleepiness, and performance decrements.
- 2) Shift schedules often create sleep debt, which reduces alertness and performance, particularly during night shifts and at the beginning of early morning shifts.

The sleepiness and fatigue reported by ATCOs can be attributed to the circadian trough occurring at night, but also to sleep deprivation and its associated sleep debt. (15)

For the shift worker, night shifts entail sleeping during the day. Again, because of circadian rhythms, and also because of the diurnal orientation of social life, ATCOs working at night get the shortest amount and poorest quality of sleep. (15)

Also, the quality of sleep ATCOs get before a night shift is poor compared to sleep before a day or evening shift, according to subjective reports of ATCOs and results obtained with sleep lab measures. (15)

Fatigue, sleepiness, circadian trough, sleep deprivation, low traffic load, and low lighting levels have been linked as factors contributing to decreased performance and vigilance during night shifts in ATM. (15)

Working day shift can also entail sleep loss because ATCOs do not go to necessarily go to sleep earlier at night before working an early day shift, and get less sleep in the morning (compared to the evening shift and days off) due to early rise. (15)

Shift workers can have difficulties in compensating for an early rise the next morning by going to sleep earlier, because there is a period before usual sleep onset when the biological clock seems to prevent sleep. (15)

Compared to performance later in the day, early day shift performance is decreased. Considering the higher frequency of accidents during early morning shifts among other groups of workers, operational safety is may be threatened by fatigue and performance decrements experienced at the start of early morning shifts. (15)

## SCHEDULING THE SHIFTS

In addition to the problems inherent in night and day shifts, scheduling the shifts also introduces difficulties. Scheduling is a sensitive topic and a satisfactory solution to the optimal scheduling system for all air traffic control situations remains elusive.

As can be seen in Table 1, various types of shift schedules exist to cover the 24-hour period of operations in air traffic control facilities. (15)

Permanent schedules involve always working the same shift. The slow rotation schedule, a variation of the permanent schedule, involves working five straight days on a specific shift, then rotating to another shift the following week. Other schedules imply rapid rotation of shifts during the week. Although the exact configuration may vary, two main kinds of rapid rotation schedules exist: clockwise rotation, and counter-clockwise rotation. (15)

In the clockwise rotation (also called forward or delayed rotation), the work week starts with a day shift, rotating later in the week to an afternoon shift, and finally changing to a night shift.

In the counter-clockwise (backward or advancing rotation), the work week starts with an afternoon shift, then advances to an early day shift, to finally end with a night shift.

Table 1 Examples of shift schedules used in air traffic control facilities

Schedule	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
<b>Permanent schedule:</b>							
Week 1: 5 days	7:00-15:00	7:00-15:00	7:00-15:00	7:00-15:00	7:00-15:00	off	
Week 2: 5 days	7:00-15:00	7:00-15:00	7:00-15:00	7:00-15:00	7:00-15:00	off	
Week 3: 5 days	7:00-15:00	7:00-15:00	7:00-15:00	7:00-15:00	7:00-15:00	off	
<b>Slow rotation:</b>							
Week 1: 5 days	7:00-15:00	7:00-15:00	7:00-15:00	7:00-15:00	7:00-15:00	off	
Week 2: 5 days	15:00-23:00	15:00-23:00	15:00-23:00	15:00-23:00	15:00-23:00	off	
Week 3: 5 days	23:00-7:00	23:00-7:00	23:00-7:00	23:00-7:00	23:00-7:00	off	
<b>Rapid rotation:</b>							
Counter-clockwise	15:00-23:00	15:00-23:00	7:00-15:00	7:00-15:00	23:00-7:00	off	off
Clockwise	7:00-15:00	7:00-15:00	15:00-23:00	15:00-23:00	23:00-7:00	off	off

# TIPS AND TOOLS FOR FATIGUE AND SLEEP MANAGEMENT

## BEDTIME RITUALS



### BEDTIME AND RISING TIME (4) (8) (11)

- ❑ For most people, a night's sleep or a night's bed-time should be no longer than **7 hours** (excessive time may fragment sleep). However it depends on the individual, some people need to sleep 9 or 10 hours, others just need 5 or 6 hours, in order not to feel sleepy and tired the next day. For example, older people need less sleep.
- ❑ Try to maintain a regular rising time (also on weekends and holidays) even if you have had trouble sleeping the night before, as "sleeping in" can disturb sleep the following night.
- ❑ Get up earlier in the morning, at least try this when you're trying to set up your new regular bedtime routine. You'll be much more tired at night and more apt to get to sleep.

- ❑ Once you're awake, get up. Don't lie in bed, thinking about getting up.

### ROOM TEMPERATURE (3) (11)

- ❑ Fresh air and a room temperature of around 18 degrees will give you the best sleeping conditions. Blankets or comforters can lock in heat without feeling too heavy or confining. Make sure your feet are warm, it's almost impossible to sleep when your feet are very cold.
- ❑ In summer, a room that's too hot can also be disruptive to sleep. An air conditioner or fan can help. If excess humidity is a problem, consider a dehumidifier. Awakening with a sore throat, dryness in your nose, or even a nosebleed are signs of too little humidity, consider a humidifier.

### WARM BATH (3) (11)

Soaking in hot water before retiring to bed can ease the transition into a deeper sleep. This may be due to a temperature shift (core body temperature drops after leaving the tub, which may signal to the body that it's time to sleep), or the sleep improvement may be related to the water's relaxing properties. Don't overdo it however, you merely want to relax your body, not exhaust it.



### YOUR BED (3) (7) (8)

Ask yourself the following questions:

Does your mattress provide the support you like? Do you wake with your back aching? Is there enough room for you and your sleep partner? Do you sleep better or worse, when you sleep away from home?

Discomfort can make falling asleep more difficult and lead to restlessness.



Mattresses can be made of slumber inner springs, foam, fabric, water or air. They may be firm or soft providing different levels of support to your body. Types of mattresses may affect body temperature and humidity, as well as comfort.

### HOW TO SLEEP? (11)

#### *Sleep on Your Back*

It's the best position for relaxing, and allows all your internal organs to rest properly. If you must sleep on your side, do it on your right side, sleeping on the left side causes your lungs, stomach and liver to press against your heart, causing stress on an organ that most of us find quite useful. Never – ever – sleep on your stomach. It causes pressure on all your internal organs – including your lungs, which results in shallow breathing. It can also, as you've no doubt discovered, cause a stiff neck and upper back problems.

Some people suggest sleeping with your head facing North. This aligns your body with the magnetic field of the planet, bringing your own energies into harmony with those of the Earth. Sounds like a pretty bizarre theory? Try it. You'll see what a difference it makes.



#### *Counting Sheep*

The old wives' cure for insomnia is to count bouncy little sheep leaping over a fence. It's possible that it doesn't work, because bouncy sheep are hyperactive and wide-awake. They're the last thing you need to dwell on when you want to go to sleep. So try another variation, count sleeping sheep. Imagine a beautiful green meadow stretching to infinity.

Every ten feet or so, right in a row, lies a peaceful, sleeping sheep. Imagine that you're just gliding by, almost floating.

And that you pass by a sheep every 3 or 4 seconds (experiment to find which time interval works

best for you). Count the sheep and glide on to the next, and the next, and so on. *Sleeping sheep are likely to be more effective.*

#### **TIPS IF YOU ARE HAVING DIFFICULTY SLEEPING (3) (4) (5) (7) (8) (11)**

- IF YOU CAN FALL ASLEEP EASILY ON YOUR SOFA OR CHAIR, AND IT IS DIFFICULT TO FALL ASLEEP IN YOUR OWN BED, YOU MAY BE ASSOCIATING YOUR BED WITH EVERYTHING BUT SLEEP. USE YOUR BED ONLY FOR SLEEP AND SEX, NOT FOR READING, WATCHING TELEVISION OR WHATEVER ELSE OCCUPIES YOU IN THE EVENING. TO LEARN HOW TO ASSOCIATE YOUR BED AND BEDROOM WITH SLEEP, RESTRICT YOUR TIME IN BED, INITIALLY, TO THE NUMBER OF HOURS YOU ACTUALLY SLEEP.
- ONLY GET INTO BED WHEN YOU ARE TIRED.
- DON'T LIE AWAKE TRYING TO GET TO SLEEP ANY LONGER THAN 30 MINUTES. IF YOU ARE STILL AWAKE AFTER 30 MINUTES, GET UP AND DO SOMETHING QUIET AND NON-STIMULATING. WHEN YOU FEEL TIRED AGAIN, GO BACK TO BED.
- WHILE IN BED, DON'T DWELL ON NOT SLEEPING OR YOUR ANXIETY WILL INCREASE.
- THINK RELAXING THOUGHTS.
- SOME PEOPLE FIND THAT A MILKY DRINK OR LIGHT CARBOHYDRATE SNACK PROMOTES SLEEP.

# NAPPING

Naps can be very useful as they can maintain or improve alertness, performance and mood. If you can't get enough sleep or feel drowsy, a nap as short as 15 minutes can be helpful. (3) (5)

The evening or night shift worker should take a nap during break time to increase alertness and reduce sleepiness. Napping at the workplace is especially effective for workers who need to maintain a high degree of alertness, attention to detail, and who must make quick decisions. In situations where the worker is working double shifts or longer, naps at the workplace are even more important and are highly recommended. (5)

## NAP TIMING (13)

Next you need to determine the best time for your nap given your schedule. Remembering your circadian rhythm, you know that there are times of the day that are more and less conducive to sleeping, regardless of how tired you feel or how much sleep you lost.

Trying to nap at a time when your body is physiologically becoming more awake may lead to an unsuccessful nap.

That is, you spend more time trying to get to sleep than you do actually napping – if you fall asleep at all.

Generally, for non-shift workers, or when on day shift the following rules of thumb can be used to determine the timing of your nap:

Avoid the period from 10 a.m. to 1 p.m. This is your "no nap zone". Naps become more restorative the further they are from your "no nap zone".

- ❑ Try to take advantage of the mid-afternoon dip when your alertness will naturally drop. This is a natural nap period.
- ❑ Naps should be placed as close to the start of your work period as possible to reap the most gain, but there should be at least 15 to 20 minutes between your nap and when you have to start working. This will enable you to overcome any sleep inertia you may be experiencing. In some cases, napping during your lunch break may provide the maximum benefit, if there is a place to properly nap.
- ❑ Napping on the job for more than 10 but no more than 30 minutes can reduce fatigue; longer than 30 minutes may interfere with your regular sleep schedule and may make you feel less alert.

## DON'T USE NAPS TO REPLACE NORMAL SLEEPING BEHAVIOUR (13)

There are two important reasons why napping should not be used regularly to replace portions of your main sleep period:

1. One solid, continuous sleep period has a greater restorative and refreshing effect on you than several sleep periods broken up over the course of the day.
2. Napping disrupts your main sleep routine, the time your body has become accustomed to sleep, and may lead to difficulty sleeping during the main sleep hours, subsequently leading to the onset of a sleep deficit.

But you should consider a nap if:

- You slept less than 5.5 hours in your bed.
- You had two or more periods of wakefulness of 30 minutes during your main sleep period.
- You felt you were in a continual state of drifting in and out of sleep.
- You felt unusually and intensely tired and lethargic upon waking.

## **TIPS (3) (7)**

- IF DRIVING, NAP IN A SAFE PLACE, SUCH AS IN YOUR LOCKED CAR AT A WELL-LIT REST STOP.
- DON'T USE A NAP TO TRY TO SUBSTITUTE A GOOD NIGHT'S SLEEP. IF YOU'RE A REGULAR NAPPER, AND EXPERIENCING DIFFICULTY FALLING OR STAYING ASLEEP AT NIGHT, GIVE UP THE NAPPING AND SEE WHAT HAPPENS.
- PRIOR TO NAPPING DO NOT TAKE ANY SORT OF SLEEPING AID OR EAT A HEAVY MEAL. THESE ACTIONS WILL MAKE YOU FEEL SLEEPY LONGER AFTER YOU NEED TO GET UP FROM YOUR NAP PERIOD.
- WHEN NAPPING DO NOT SMOKE. NICOTINE IS A STIMULANT AND CAN INTERFERE WITH YOUR ABILITY TO FALL ASLEEP.
- NAPPING BEFORE GOING ON TO A NEW SHIFT CAN HELP REDUCE FATIGUE.
- BE CAREFUL, SOME PEOPLE AWAKING FROM NAPS WILL EXPERIENCE LETHARGY AND TAKE SEVERAL MINUTES TO BECOME FULLY AWAKE. THESE FEELINGS USUALLY GO AWAY WITHIN 1–15 MINUTES, WHILE THE BENEFITS OF THE NAP MAY LAST FOR MANY HOURS.

# LIGHT

People who work at night know all too well the problem of trying to sleep when the world around them is wide awake. When the sun's rays come streaming in, it's even harder. But the sun is more than a sign that it's daytime. Light - strong light, like sunlight - is the most powerful regulator of our biological clock, which influences when we feel sleepy and when we are alert. (3)

When light from the sun (or some other bright light source) shines in the eyes, a message is sent down the pathway to the body clock. This sends a message to the pineal gland which decreases the production of melatonin, a sleep promoting hormone. About twelve hours later the body clock turns

itself back on. This signals the pineal gland to resume production of melatonin, which is released into the bloodstream and carries the hormone to the body's trillions of cells. The cells "interpret" this signal as a message that it is time to sleep. (13)

As little as 1 to 2 hours of evening bright light exposure appears to help you sleep longer in the morning. A sleep specialist can help determine whether changing your exposure to light (if sunlight isn't available, using a lightbox or light visor) might improve your sleep, and when would be the best time for you to experience bright light. (3)

## TIPS (3) (5) (7) (9) (11)

- Dim the bedroom and bathroom lighting. Install curtains and or shades. Make sure no light can enter the bedroom.
- Wear eyeshades.
- An illuminated bedroom clock is a source of light that can be annoying if you're having a hard time getting to sleep. If you can't replace the clock, at least block its light with something.
- Exposure to bright lights inhibits natural production of melatonin preventing sleep. Such bright light for 30 minutes to an hour after getting up can help reset the body clock.
- If you plan on sleeping right after a night shift, wear dark glasses home in the morning so the rising sun will not block release of your sleep hormone (melatonin).
- To stay awake, work under bright lights or at least take brief breaks every half hour or so and spend a few minutes under a bright light.

# NOISE

Do you find your sleep disrupted by noises such as the screech of sirens, the rise and fall of conversation, a dog barking, or a partner snoring? If noise is disturbing your sleep, take a look at the following tips. (3)

## TIPS (3) (5) (7) (9)

- Soundproof your sleeping quarters with additional insulation (double glazed windows, heavy curtains, carpeting) or if possible moving it to a quieter part of the house or basement.
- Use relaxing music or tapes.
- Minimize distracting sounds:
  - Turn the phone off, move it to a distant part of the house, set it on soft ring(low ring tone) or get an answering machine
  - Wear ear plugs
  - Use "white noise" (such as a fan or humidifier) to block out other sounds
  - Place a sign on your front door to discourage interruptions while sleeping
  - Ask neighbours not to make loud noises (e.g. mowing lawn) during your sleep hours

# MUSIC



Play some soft, soothing music that will lull you to sleep.

There are cassettes and records designed for that very purpose, some are specially composed music, others have sounds of waves rhythmically breaking, or the steady pattern of a heartbeat. If you don't have a record player, cassette player or CD player that turns off automatically, we don't suggest this. If you have to get up and turn it off at the end, you've obviously lost its effect. (11)

## BOOKS, TV AND INTERNET

With the rise of the Internet and chat rooms, yet another obstacle to a restful night has appeared. It's easy to lose track of time on the Internet, or to get deeply involved in a discussion in chat rooms. Try setting a timer to alert you to when it's bedtime if you enjoy web surfing before you retire. (6)

Wait at least one-half hour (preferably longer) before going to bed after reading or watching television. The reason for this is that no matter how passively we watch television, or how harmless the book we read is, our minds may still be over stimulated, and an over stimulated mind – along with anxiety and stress – is likely to keep us awake. (11)



Some people say that reading a detective story or some such escapist book helps put them to sleep. If it works for you, great. (11)

## CAFFEINE



Coffee, tea, chocolate, cola drinks and other drinks contain caffeine.

Caffeine is a stimulant, which means it has an alerting or wake-up effect. (3)

How individuals respond to caffeine is variable. (3)

Tolerance is developed when caffeine is used on a regular basis. While the effects of caffeine are independent of age and gender, certain factors can extend or decrease the length of the effect. In medium to light users, the effects last about 5 to 6 hours,

while in high level users the effects only last 3 to 4 hours. For some people, a small amount early in the day can cause problems falling asleep 10 to 12 hours later. (3)

Caffeine, has been shown to improve endurance and aerobic activity, but can also affect the "mental energy" by enhancing vigor, efficiency, and clear-headedness, as well as vigilance and alertness. Some of these effects can occur with as little as 32 mg of caffeine, equivalent to a

weak cup of tea. It also improves both visual and auditory vigilance and usually takes about 15 to 20 minutes to take effect. (13)

Caffeine can be an affective alertness booster if used properly. As a short-term measure it can be used until more substantial countermeasures – such as changing sleep/wake routines, nutritional habits and work schedule – can be implemented. It should not be viewed as an ongoing strategy for maintaining alertness. (13)

Consuming over 400 mg at a time has been shown to degrade performance by producing physical symptoms such as

uncontrollable shaking and inability to focus mentally. (13) Therefore, sometimes you want a little caffeine to boost your alertness, and sometimes you need to avoid caffeine so you'll be able to fall asleep. (13) Unfortunately, caffeine is often seen as fuel. Excessive amounts of caffeine intake often indicate a vicious cycle. You need to stay awake, so you drink coffee, but the caffeine prevents you from resting properly, so you're tired, and need caffeine to stay awake, and so on. (6)

Here's a guide table (TCRP Report 81 - National Research Council, Washington D.C., 2002) that gives you the caffeine content of various foods and beverages.

Food	Serving Size	Milligrams of Caffeine
<b>Coffee</b>		
Regular *	8 oz	80-150
Decaffeinated	8 oz	5
<b>Tea</b>		
Brewed **	8 oz	9-50
Decaffeinated	8 oz	3-9
Herbal (Fruit) ***	8 oz	0
Iced	12 oz	22-70
<b>Chocolate</b>		
Hot Cocoa	8 oz	5-8
Milk Chocolate	1 oz	1-15
Dark Chocolate	1 oz	5-35
<b>Soft Drinks</b>		
Coca-Cola	12 oz	46
Pepsi	12 oz	38
Sprite	12 oz	0
7-UP	12 oz	0

\* Depending on roast, method, and whether served with creamer, milk, etc.

\*\* Depending on time steeped and type of tea leaves.

\*\*\* Most fruit or herbal tea contains no caffeine. There are some exceptions.

Source:

Wasleben, J.A., and Baron-Faust, R. *A Woman's Guide to Sleep*. New York: Crown Publishers, (2000).

Lieberman, H.R., "Caffeine" *Factors Affecting Human Performance Vol. II: The Physical Environment*, pp. 49-72. London: Academic Press, (1992).

How do you determine the effect of caffeine effect on yourself? Try eliminating caffeinated food and drink after lunch for a few weeks. Are you sleeping better? If so, you may have identified the culprit. (3)

#### **TIMES WHEN CAFFEINE USE MAY BE APPROPRIATE: (13)**

- ❑ Midway through the night shift on the first or second day of the work week (The first 2 nights of the work week are most difficult if you slept at night on your days off).
- ❑ Mid-afternoon when the afternoon dip in alertness is significant due to inadequate nighttime sleep.
- ❑ Prior to an early morning commute home but not within 4 hours of a planned sleep period.

#### **TIPS (7) (9)**

- Try to avoid caffeine 4-6 hours before going to sleep. Women tend to retain caffeine longer than men (up to 13 hours). Shift workers are advised to limit the dose to around 300 milligrams of caffeine per day and to avoid caffeine during the last half of the evening shift or night shift, since the worker's bedtime will come soon after getting home. Fruit juice is good alternative drink for the second half of the shift.
- 2-4 cups of coffee or equivalent caffeine (tea, cola drinks, chocolate, etc.) can increase alertness; many of the over the counter (OTC) drugs also have caffeine so be careful taking them before bedtime (e.g., Vivarin (alertness aid), cold relief tablets, Excedrin (headache tablets), etc.)

## **ALCOHOL**



The tradition of an alcoholic "night cap" before bedtime also causes sleepless nights. Alcohol consumed at bedtime, after an initial stimulating effect, may decrease the time required to fall asleep (many people with

insomnia consume alcohol to promote sleep). (6) (12)

However, studies show that a moderate dose of alcohol consumed as much as 6 hours before bedtime can increase wakefulness during the second half of sleep. The subject may sleep fitfully during the second

half of sleep, awake from dreams and return to sleep with difficulty. (12)

This sleep disruption may lead to daytime fatigue and sleepiness. (12)

Drinking too much of any beverage can also lead to more awakenings because of the need to urinate during the night. (12)

Reduced alertness may potentially increase the sedating effect of alcohol in situations such as

rotating sleep-wake schedules (e.g., shift work). A person may not recognize the extent of sleep disturbance that occurs under these circumstances, increasing the danger that sleepiness and alcohol consumption will co-occur. (12)

### **TIPS (5)**

- Don't stop for a drink after work; although at first you may feel relaxed, alcohol disturbs sleep.

## NICOTINE



Nicotine, like caffeine, is a stimulant. (3) When smokers go to sleep, they experience nicotine withdrawal. Research suggests that nicotine is linked to difficulty falling asleep and problems waking up. They may also experience more nightmares. (3)

### **TIPS (3)**

- Try to avoid cigarettes and other nicotine sources before bedtime.

# FOOD AND DIET

Caffeine and alcohol aren't the only substances that affect your sleep.

Studies have shown that diets deficient in certain nutrients, particularly copper, iron and aluminum, can cause disruptions in sleep patterns. A well-balanced diet can help reduce fatigue levels. (4)



Everything you eat can affect nighttime slumber. For example, tomato products and spicy foods give many people heartburn (as does eating too fast). Lying down makes heartburn worse, and heartburn itself makes falling asleep more difficult and also awakens sleepers with middle-of-the-night discomfort. (3)

Another cause of sleep problems can be eating too much (of any food). A heavy meal close to bedtime may make you less comfortable when you settle down for your night's rest. At the same time, going to bed hungry can also be disruptive to sleep as going to bed too full. (3)

The timing of meals is almost as important as what an individual eats. Eating breakfast in the morning starts the body's metabolism and provides energy

after the overnight fast. It also prevents midmorning irritability and lethargy. (13)

The midday meal is important for sustained alertness in the afternoon. Protein (e.g., meat, eggs, and beans) is important at this meal because it is believed to trigger a rise in dopamine, a brain chemical associated with mental energy. Similarly, excessive intake of high-carbohydrates (e.g., sugars and starches) food at midday may increase serotonin, a brain chemical involved in sleepiness. (13)

## **BEDTIME SNACK (11)**

A small, low protein, high carbohydrate bedtime snack, such as juice and cookies, eaten about an hour before bedtime, can help you fall asleep sooner (Pizza does not qualify). Also, studies indicate that foods with large amounts of the amino acid L-tryptophan help us sleep better. L-tryptophan is used by the brain to make the neurotransmitter serotonin, which is responsible for slowing down reaction time, imparting satiety (reducing that being full feeling) after a meal and inducing sleep.

As examples, we have:

- ❑ warm or hot milk (but not cold milk)
- ❑ eggs
- ❑ cottage cheese

- chicken
- turkey
- and cashews

Milk has tryptophan, so a glass of warm milk 15 minutes before going to bed can help people relax and fall asleep. If you don't like milk - or are avoiding dairy products - try a cup of hot

chamomile, catnip, anise or fennel tea. All contain natural ingredients, which may help you sleep. Most health food stores will also have special blends of herb tea designed to soothe you and help you get to sleep.

Try both food theories, and see which works best for you.



### MELATONIN SUPPLEMENTS (10)

In the quest for a better night's rest, many people turn to melatonin supplements. Melatonin is a natural substance that builds up in the body as daylight fades, making people drowsy.

You may want to try eating things that raise your melatonin production.

These are:

- spirulina seaweed
- soy nuts
- cottage cheese
- chicken
- pumpkin seeds
- turkey
- and dried watermelon seeds

Melatonin rich foods include:

- oats
- sweet corn
- rice
- ginger
- tomatoes
- bananas
- and barley

Some vitamins and minerals such as B6, niacin amide, calcium, magnesium, or antioxidants may help. Other herbal remedies to consider are Valerian root, Skullcap, Passion flower, Wood betony, or California poppy.



### TIPS (3) (7)

- Do not eat or drink too much close to bedtime.
- Consider a small snack to ease bedtime hunger pains.
- Start a shift with a meal of proteins to increase alertness; finish the shift with carbohydrates (sugars, starches) to facilitate sleep.
- Snack healthy – munch on vegetables and fruits rather than chips and fast food.

# MEDICATIONS

A large number of over-the-counter and prescription drugs can disrupt your sleeping cycle. Whenever you start a new medicine, keep a close eye on your sleeping patterns and consult your doctor if you believe the medication interferes with your rest. Insomnia is a common medication side effect, and a complete list of potential insomnia-causing medicines would cover pages.



## TIPS (7)

- Sleep aids (e.g., Nytol) may initially help you to go to sleep, but it may not help you get a deep sleep, may become habit forming, and can leave you drowsy on awakening.
- Some herbal preparations are reported to help sleep: chamomile, valerian, primrose, catnip, fennel, passion flower, rosemary, skullcap, hops, bergamot, pennyroyal, lemon balm, and gentian root. For alertness, some herbs include: peppermint, blackberry, raspberry, strawberry, juniper and thyme. There is some controversy about their effectiveness however, and some people may be allergic to certain herbs.
- Antidepressants (Monoamine oxidase (MAO)) can cause sleeplessness, may be habit forming, suppress REM (Rapid Eye Movement - dream) sleep, cause REM rebound (intense dreaming), fast pulse and dry mouth.
- Antihistamines and bronchodilators may cause drowsiness but have side effects.
- Tranquilizers (e.g., Valium, Librium) may cause daytime sedation and may contribute to irritability.
- Melatonin has been used to treat jet lag and some shift workers find it helpful in making a shift adjustment, but it has not been tested for long-term side effects.

# EXERCISE



Exercise can be beneficial for good sleep, especially when done regularly in the afternoon and not too close to bedtime. If you don't exercise regularly, add good sleep to a long list of reasons why you should take up the practice.

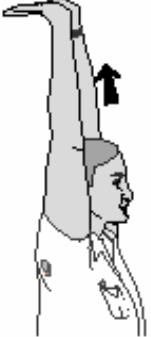
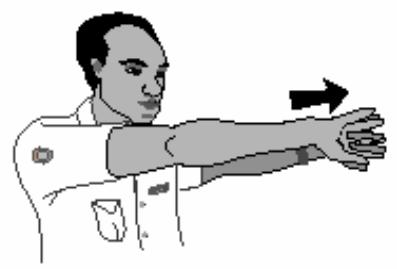
- ❑ When you exercise, whether you are physically fit and a regular or occasional exerciser, the type of exercise you select, and your age or sex may all affect sleep. (13)
- ❑ People should avoid strenuous exercise right before sleep and even up to 3 hours before bedtime. That's because exercise has an alerting effect and raises your body temperature. This rise leads to a corresponding fall in temperature 5 to 6 hours later, which makes sleep easier then. That's why late afternoon may be the perfect time for your exercise. If you've been exercising close to bedtime and having trouble falling or staying asleep, you may want to begin exercising after you sleep instead. (13)
- ❑ Physical fitness training has been demonstrated in shift workers to reduce general fatigue and sleepiness at work, increase sleep duration somewhat, and decrease musculoskeletal symptoms. (9)  
Exercise recommendations for shift workers include: (9)
  - 1) Moderate physical exercise is preferred over intensive training;
  - 2) Exercise should be done a few hours before the main sleep period;
  - 3) For morning or day shifts, the best exercise time is after the shift. After night shifts exercise should be done before an evening nap.
- ❑ People with "mental" jobs, like office workers, have far more trouble with insomnia than do people who work physically hard all day. Even 15 minutes a day of exercise (generally 3 hours before going to bed will allow your body to relax after exercise) will give your body the activity and oxygen it needs to help you relax more and sleep better. (11)

#### **TIPS (4) (7)**

- Exercise regularly during the day so that your body feels tired enough to want rest at bedtime. If you do not get enough exercise, try taking a walk a few hours before bedtime.
- Excessive exercise can leave you with aches or jumpiness that interfere with sleep.
- Exercise several hours before sleeping can help you sleep better. Avoid exercise right before sleep and even up to three hours before bedtime.
- Exercising briefly on the job can briefly increase your alertness, but unfortunately has only a short effect before fatigue returns.
- Cardiovascular exercise is most recommended in which you raise your heart rate for 20-30 minutes at least three times a week; alternately, walking for longer periods is also helpful.

## BREAK TIME STRETCHES

Feelings of fatigue can result from remaining seated for a long time. Being in this position causes blood to pool in the lower legs and feet, makes the hamstring muscles tighten up and causes back and neck muscles to stiffen. (13) Next we'll show you some stretching exercises recommended by the National Research Council (TCRP Report 81, Washington D.C., 2002) (13) that you can do on your break time to improve circulation and loosen tight areas.

BODY PART	DIRECTIONS	DIAGRAM
Neck	<b>Head Turn</b> -Keeping your head level, turn your chin towards a shoulder. You should feel the stretch in along the neck, opposite the shoulder your chin is towards. Hold the stretch for about 10 seconds and relax. Repeat twice, each side.	
Shoulders	<b>Shoulder Shrug</b> -With arms hanging loosely at your side, raise you shoulders towards the ceiling until you feel a slight tension in the shoulders and neck area. Hold for 5 seconds, then relax. 2 times.	
Arms	<b>Overhead Stretch</b> -Raise your hands above your head and interlace your fingers with palms upwards. Push slightly up and back until you feel slight tension in the upper back, arms, and shoulders. Hold stretch for 15 seconds, then relax.	
	<b>Arms Straight in Front</b> -Interlace fingers, palms facing out, and hold arms straight out in front of you until you feel tension in the arms, shoulders, middle of upper back, hands and fingers. Hold for 15 seconds.	
Arms (cont.)	<b>Triceps and Top of Shoulders</b> - Bend one arm behind your head with one hand holding the other arm at the elbow, allowing the hand of the bent arm to rest on the upper back between the shoulder blades. Gently push the elbow of the bent arm down towards the back to stretch the triceps and top of shoulders. Hold for 15 seconds and then repeat with other arm.	

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**Upper Back**

**Shoulder Blade Stretch-**  
Interlace fingers behind your head. Keeping your elbows straight, gently pull your arms back by pushing your shoulder blades together. Hold for 4-5 seconds. Can be done seated or standing.



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**Entire Back**

**Bend while Sitting-Lean forward and touch the floor with your hand if possible. This promotes circulation even if you do not feel a stretch. Hold for 15-20 seconds.**



**Twist while Standing- Keeping your feet pointed straight ahead and knees slightly bent, place hands on hips and gently twist your waist.**



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**Legs**

**Calf Stretch-Stand a little away from a wall or other solid support and rest your head into your forearms bracing the wall. Bend one leg slightly and place foot on the ground straight in front of you. Step backwards with opposite leg and slowly move your hips forward until you feel the stretch in your calf. Do not bounce. Hold for 10-15 seconds. Repeat with other leg.**



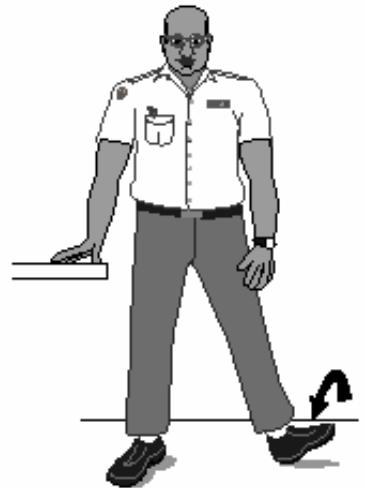
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**Ankle/Feet**

**Achilles Tendon Stretch-**  
Keeping a similar position as in the Calf Stretch, straighten your back by placing your hands on the wall with arms outstretched. Bend the knee of the leg behind you slightly and lower your hips downward until you feel the tension in the Achilles tendon. Hold for 5-10 seconds and repeat with other foot.



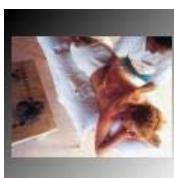
**Ankle Rotation-While standing, support yourself by holding on to something for balance. Lift one foot slightly and rotate the ankle 10-12 times clockwise, then counterclockwise. Repeat with the other foot.**



## RELAXATION

Relaxing may mean choosing the bedtime ritual that's right for you.

Does gentle music lull you to sleep? A calming soak in a warm bath or hot tub? Cosy pyjamas? Cuddling with your partner? Meditation or a prayer? But there are techniques you can do directly with your body. (3)



### MASSAGE (11)

Have your spouse (or whoever) give you a massage just before going to sleep. If you can convince them to give you a full body massage, great. If not, even a short backrub and/or a face and scalp massage can be a big help. Have them make the massage strokes slow, gentle, yet firm, to work the tension out of your muscles and soothe you to sleep.

### ABDOMINAL BREATHING (8)

One of the most effective ways to relax at the end of a stressful day is to do some *abdominal breathing*. Put on some relaxing music or nature sounds (the sound of rain or running water). Dim the lights or turn them off. Stretch out on the bed or sofa and roll your shoulders around a few times. Now you can focus on your breathing.

When you are tense, breathing can be irregular and forced. Most people also use their chest to breathe when they are upset. The most natural way to breathe is to use the diaphragm which *pushes down* into the abdomen. Breathing should be relaxed and rhythmic.

Take note of the following:

- Is your breathing rhythmic?
- Is your breathing relaxed?
- Is your chest moving up and down?
- Is your abdomen moving in and out?

Try the following exercises:

- Breathe without using your chest at all. Support your head on a pillow in order to relax your neck muscles.
- Take several deep breaths into the abdomen. Exaggerate this motion to give yourself a better sense of which muscles are involved.
- Place a book on your chest and another on your abdomen. The book sitting on the chest should remain still. The book on the abdomen should clearly move up and down in time with your breathing.

Practice these exercises for a minimum of 30 minutes each day so that the abdominal breathing becomes a habit that you do without thinking. Once you have formed this habit, you are ready to move on to the next phase. In this phase, you simply add a brief pause at the end of each breath. Therefore, the breathing cycle becomes: *inhale, exhale, pause... inhale, exhale, pause...*

If you find that the worries of the day are intruding on your breathing exercises, simply say to yourself: "Ah ha, my mind has wandered. Let's return to the breathing task."

If this is not successful in getting you refocused on the breathing, try repeating a simple two-syllable expression to yourself. Some examples are "one-two", "deep down", and "in-out".

## DEEP BREATHING (11)

Most people breathe very shallowly, using only the top part of their lungs. *Deep Breathing* allows us to use our entire lungs, providing more oxygen to our bodies, and energizing and rejuvenating every organ and cell in our bodies. Some people consider this technique as probably the most effective and beneficial method of relaxation.

1. Lie on your back.
2. Slowly relax your body, starting with your feet and moving through every part of your body until you have reached – and relaxed - your face and scalp.
3. Do a quick check to see if you've missed any place. If so, relax it.
4. Slowly begin to inhale; first filling your lower belly, then your stomach area, and then your chest and the top of your lungs almost up to your shoulders. Hold for a second or two, and then begin to exhale. Empty the very bottom of your lungs first, then the middle, then finally the top.

5. Continue this breathing for 4 or 5 minutes. Don't force your breathing; it's not a contest to see how much air you can take in. Just do it in a relaxed, peaceful manner.
6. After a while, imagine that you are resting on a warm, gentle ocean. The sun is shining peacefully on your body. Imagine that you rise on the gentle swells of the water as you inhale, and that you slowly descend as you exhale.
7. Continue this relaxing breathing as long as you wish (hopefully until you fall asleep).

**Note:** This is particularly effective when you do it after Progressive Relaxation (see below) - if you haven't already fallen asleep!

## PROGRESSIVE RELAXATION (11)

This exercise is most effective when you tape record the instructions in advance, preferably in your own voice. This way you don't have to concentrate on remembering the instructions.

We'll give you the instructions here. You tape record them, with a short pause after each sentence to allow yourself time to actually do the sensing and relaxing. Lie on your back, close your eyes, and begin to listen to the tape.

1. Feel your feet. Feel the weight of your feet. Feel your feet relax and sink into the bed.
2. Feel your lower legs. Feel the weight of your lower legs. Feel your lower legs relax and sink into the bed.
3. Feel your knees. Feel the weight of your knees. Feel your knees relax and sink into the bed.
4. Feel your upper legs. Feel the weight of your upper legs. Feel your upper legs relax and sink into the bed.
5. Feel your hands. Feel the weight of your hands. Feel your hands relax and sink into the bed.
6. Feel your lower arms. Feel the weight of your lower arms. Feel your lower arms relax and sink into the bed.
7. Feel your elbows. Feel the weight of your elbows. Feel your elbows relax and sink into the bed.
8. Feel your upper arms. Feel the weight of your upper arms. Feel your upper arms relax and sink into the bed.
9. Feel your buttocks. Feel the weight of your buttocks. Feel your buttocks relax and sink into the bed.
10. Feel your back. Feel the weight of your back. Feel your back relax and sink into the bed.
11. Feel your pelvic and belly area. Feel the weight of your pelvic and belly area. Feel your pelvic and belly area relax and sink into the bed.
12. Feel your chest. Feel the weight of your chest. Feel your chest relax and sink into the bed.

13. Feel your shoulders. Feel the weight of your shoulders. Feel your shoulders relax and sink into the bed.
14. Feel your neck, both front and back. Feel the weight of your neck. Feel your neck relax and sink into the bed.
15. Feel your skull. Feel the weight of your skull. Feel your skull relax and sink into the bed.
16. Feel your mouth. Feel any tension in your mouth. Feel your mouth relax and any tension slide off into the bed.
17. Feel your eyes. Feel any tension in your eyes. Feel your eyes relax and any tension slide off into the bed.
18. Feel your entire face. Feel any tension in your face. Feel your face relax and let any tension slide off into the bed.
19. Mentally scan your body. If you find any place that's still tense, relax it and let it sink into the bed.

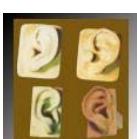
## OTHER TECNIQUES

### TOE WIGGLING (11)

Eastern sciences (such as yoga) have known for thousands of years that the mind and body are connected (actually they're not just connected, they're one, but the idea that they're connected is sufficient for our purposes here). So the body has to be relaxed for the mind to be relaxed.

- *Lie on your back and wiggle your toes up and down 12 times, wiggling the toes of both feet at the same time. This will relax your entire body, inside and out.*

How does it work? According to Reflexology your feet are a kind of master control panel for the rest of your body. "Meridians" in the body – those channels of energy treated by acupuncture – end up in the feet. So the ends of those meridians in your feet connect with every organ and every part of your entire body. When you wiggle your toes, you are stimulating – and thus relaxing – your entire body. Incidentally, this is a good place to mention that you can be energized and relaxed at the same time. It's a matter of the quality of that energy. If it flows freely and smoothly, you will be relaxed. If the energy flow in your body is restricted or blocked, you will be tense. Toe wiggling helps to bring about a relaxing, free-flowing energy. This same exercise is also great first thing in the morning before getting out of bed in order to energize the body.



### QUIET EARS (11)

Is an ancient Eastern meditation technique, as well as a great way to fall asleep.

1. Lie on your back with your hands behind your head, fingers

2. interlocked, and your palms cupping the back of your head. Get as relaxed as possible (may take a little while to get used to).
3. Place your thumbs in your ears so that you are pressing the outer flap of your ear and blocking the entrance to the ear canal.
4. Lie quietly and listen for a high-pitched sound that you will gradually hear inside your head.
5. Lie there for 10 to 15 minutes and concentrate on that sound. Then put your arms to your sides and go to sleep (don't worry about all the stories of people who have ringing in their ears, this is different – and natural).

## RIDE HOME

If you are sleepy when your shift is complete, try taking a nap before driving home. Remember that sleep can quickly overcome you when you least expect or desire it to. (3)



### TIPS (3) (5)

- Carpool, if possible. Have the most alert person do the driving.
- Drive defensively.
- Don't stop for a "night cap".
- If you are sleepy, stop to nap, but do so in your locked car in a well-lit area.
- Take public transportation, if possible.

## EMOTIONS: STRESS, DEPRESSION AND MORE

Emotions can keep us up at night: stress, excitement, anger and grief can all prevent a restful night. A fight with a spouse, or worry about an upcoming deadline, can lead to sleeplessness. **Most often, this is temporary: when the emotion ends, sleep patterns return to normal.** Chronic stress, worry and depression can cause longer-term rest disturbances. (6)

If you find your thoughts turning to worries when bedtime approaches, keep a worry book by your bedside. Jot down a brief note about what's on your mind. Schedule time the next day to focus on the problem and a solution. Problems often seem smaller in the daylight. (6)

## BALANCING LIFE AND WORK

The shift worker faces **special** problems in trying to maintain family relationships and social and community ties. It becomes difficult to balance work, sleep and personal time. (3)

For individual coping strategies to be effective, families must be involved, that is why it is

important to talk with family members and friends about your concerns. Remember that sleep loss and feeling at odds with the rest of the world can make you irritable, stressed and depressed. As one expert puts it, "Blame the shift work - not your kids!" (3) (9)

### FAMILY SUPPORT AND EDUCATION TIPS (7)

- At times your shift work will require you to spend less time with your family and friends.



Your job requires you to sleep enough to perform at an acceptable, alert state when on duty. For this to happen, you cannot skimp on your sleep time. Rather, plan times when you will see your friends and daily time for your family so no one feels neglected. Protect your schedule of activities with your family.

- Family Scheduling - Post a calendar so all family members know what's going on shiftwise.
- Hold family meetings to discuss any problems with shift work before they become bigger.
- Explain shift work and daytime sleeping to younger children in terms that they can understand, so they are less likely to make noise.

# DECREASING THE EFFECTS OF SHIFT WORK

## SOME GUIDELINES

- ❑ Try following as closely as possible the same sleep schedule on both work days and days off. (2) (13)

If you work nights, this may not be feasible due to family and social activities. For night workers whose personal schedules allow them to continue their workday sleep pattern on days off and who feel their bodies are adjusted to the night work schedule, this is an appropriate sleep strategy. However, most people never completely adapt to working nights and sleeping during the day. This means that you will probably be less fatigued if you return to night time sleep on days off. (13)

For people not working night shifts, plan on: (13)

- Obtaining 8 hours of sleep each night.
- One continuous sleep period each day without naps or other sleep periods.
- Starting your sleep time prior to 3 a.m. and ending your sleep prior to 11 a.m.

For people regularly working night shifts, plan on: (13)

- Trying to get 9 hours sleep per day; calculate that you will need another hour of sleep per day than your day-working counterparts due to less restorative sleep.
- If possible, waiting to start your main sleep period until you hit your circadian midday dip – around 2 to 3 p.m., and sleep for 9 continuous hours.
- If unable to wait to sleep or have other time constraints during the day, start your first sleep period as soon after work as possible. Calculate how many more hours you need to equal 9 and try to get those either starting at the midday dip or prior to going to work for the following shift. If you choose this second option remember to leave at least 1 hour between when you wake up and when you are to report to duty.

- ❑ A couple of days before starting a night shift, go to bed a bit later at night and wake up later **in the morning**. This phase delay will give your circadian rhythm a head start for adjusting to the new shift. (2)
- ❑ Avoid working other jobs on days off. (13)
- ❑ Avoid working every day of the week. (13)
- ❑ Avoid extended work hours; this includes working prolonged shifts and excessive overtime, and taking short breaks. (1)

- ❑ Avoid long commutes; they use up valuable time that could be spent sleeping. (1)
- ❑ Decrease the number of night shifts worked in a row. Shift workers working the night shift sleep less than day workers and become progressively more sleep deprived over several days. If one can limit the number of third shifts to 2 to 4, with days off in between, recovery from sleep deprivation is more likely. (1)

If working a 12-hour shift instead of the usual 8 hours, it is recommended that one limits work to 4 shifts in a row. Furthermore, one should optimally have more than 48 hours off after a string of night shifts. (1)

- ❑ Avoid, rotating shifts more than once a week. It is more difficult to deal with such alteration than it is to work the same shift for a longer period of time. The sequence of shift rotation can be important as well. Working the first shift (day), then the second shift (evening), and then the third shift (night) is easier than working the first, the third, and then the second shift. Make sure it rotates in a forward direction – day, evening, night – rather than backward: night, evening, day. (1)
- ❑ Get sufficient sleep on days off. Practice good sleep hygiene by planning and arranging a sleep schedule and by avoiding caffeine, alcohol, and nicotine. (1)
- ❑ Wear wraparound dark glasses on your way home from work if you are on the night shift to keep morning sunlight from activating your internal "daytime" clock. (3) 
- ❑ Set the stage for sleep even though it might be broad daylight outside and prepare your body and mind. Ensure that you have a quiet place to sleep during the day. (2) 
- ❑ At home, ask family and friends to help create a quiet and peaceful setting during your sleep time. Have family members wear headphones to listen to music or watch TV. Ban vacuuming, dish washing, and noisy games during your sleep time. (3)
- ❑ Put a "Do Not Disturb" sign on the front door so that delivery people and friends will not knock or ring the doorbell. Schedule household repairs for after your sleep time. (3) 
- ❑ Make a nutrition plan. Planning your meals ahead of time, and when you will eat them will play a large role in how well you will adapt to working shifts. Analyse what you are currently eating and determine its caloric and fat content. (13)
- ❑ Avoid drinking caffeinated beverages for at least 4-6 hours before sleep. (13)
- ❑ Eat at or before 1 a.m. and after 5 a.m. Your body has a rhythm for food digestion, which slows down during the late night-early morning hours. If you eat heavy meals during this time, the food will likely remain undigested for much longer than normal, which may lead to you having gastrointestinal distress or 

constipation. You are also more likely to convert the food into stored fat. Eat only light snacks - such as fruit, soup and toast - at night. (2) (13)

- ❑ Avoid meals of more than 600 calories as they can induce sleepiness. Large meals right before or during your work period should be avoided, regardless of your work shift. This is because your body is diverting its resources to digest your food and store it rather than use your reserves to maintain proper body functioning and alertness. (13)
- ❑ If you notice big discrepancies in what you eat, what you should eat, and when: (13)
- ❑ Try to plan out (with your family if applicable) your meals right before and during your work period.
- ❑ If you do not pack a lunch, avoid restaurants that serve only fried, fast or greasy food. If you must eat from vending machines, try to avoid foods high in carbohydrates, such as cold cut sandwich meats and chips.

***Please remember that there is no one “best” sleep pattern for all shift workers.***

***You must determine the scheme that provides you the most restful sleep***

### PROMOTING ALERTNESS AT WORK (3)

Just as you can take steps to ensure a good night's (or day's) sleep, you can try these steps to stay alert on the job.

- ❑ Take short breaks throughout the shift.
- ❑ Try to work with a "buddy". Talking with co-workers can help keep you alert. Also, co-workers can be on the lookout for signs of drowsiness in each other.
- ❑ Try to exercise during breaks. Use the employee lounge, take a walk, play basketball in the parking lot, or climb stairs.
- ❑ Try to eat three normal meals per day. Eat healthy snacks, avoiding foods that may upset your stomach.
- ❑ If you drink a caffeinated beverage (coffee, tea, and colas), do so early in the shift, e.g., before 3 a.m. for the night worker.
- ❑ Don't leave the most tedious or boring tasks to the end of your shift when you are likely to feel the drowsiest. Night shift workers hit their lowest period around 4 a.m. This is the time when human errors are most likely.
- ❑ Exchange ideas with your colleagues on ways to cope with the problems of shift work. Set up a support group at work

so that you can support and learn from each other.

### FOR THE EMPLOYER (3)

There are a number of ways of making workplace safer and more productive for shift workers.

Educate managers and shift workers about the need for sleep and the dangers of fatigue.

- ❑ Install bright lights in the work areas. A well-lit workplace signals the body that it is time to be awake and alert. Provide vending machines with healthy food choices and a microwave oven.
- ❑ Schedule shifts to allow sufficient breaks and days off, especially when workers are reassigned to different shifts. Plan enough time between shifts to allow employees to not only get enough sleep, but also attend to their personal lives. Don't promote overtime among shift workers.
- ❑ Encourage napping by providing a sleep friendly space and time for scheduled employee naps. A short break for sleep can improve alertness, judgement, safety and productivity.

## WHEN TO SEEK HELP

Having a sleep problem is serious and is not something that will resolve by itself. Similarly, it is not something to be ashamed of.

If your sleep problems persist for longer than a week and are bothersome, or if sleepiness interferes with the way you feel or function during the day, a doctor's help may be needed. (4)

To get the most out of your doctor's visit, you'll find that it is often helpful to keep a diary (see Attachment A) of your sleep habits for about ten days to identify just how much sleep you're getting over a period of time and what you may be doing to interfere with it. It can help you document your problem in a way that your physician can best understand. (4)

In attachment A, you will find tools to help you test and plan your sleep and test your knowledge on sleep issues.

## WANT TO KNOW MORE?

The following documents were used in the preparation of this handbook:

1 – Sleep Channel

[www.sleepdisorderchannel.com](http://www.sleepdisorderchannel.com)

2 – Correctional Service of Canada

[www.csc-scc.gc.ca/text/pblct/forum/e04/e041d\\_e.shtml#top](http://www.csc-scc.gc.ca/text/pblct/forum/e04/e041d_e.shtml#top)

3 – National Sleep Foundation, Washington, USA

[www.sleepfoundation.org](http://www.sleepfoundation.org)

4 – University of Chicago, Division of Biological Sciences

<http://scc.bsd.uchicago.edu/gettinggoodnightsleep.htm>

5 - Red River Sleep Center, Alexandria, USA

[www.redriversleepcenter.com](http://www.redriversleepcenter.com)

6 – Sleep Deprivation Center

[www.sleep-deprivation.co.uk/html/effects.php3](http://www.sleep-deprivation.co.uk/html/effects.php3)

7 – College of St. Scholastica, David Swenson

[www.css.edu/users/dswenson/web/LECS/Shift work.html](http://www.css.edu/users/dswenson/web/LECS/Shift%20work.html)

8 - Vancouver Sleep and Breathing Centre

[www.sleep-breathing.bc.ca](http://www.sleep-breathing.bc.ca)

9 – Duval County Medical Society Online, Florida, USA

[www.dcmsonline.org](http://www.dcmsonline.org)

10 – Body Health Resources Corporation, New York, USA

[www.thebody.com/wa/fall96/insomnia.html](http://www.thebody.com/wa/fall96/insomnia.html)

11 – Alphasleep Diagnostic Centers, LLC, Mississippi, Colorado

[www.denversleep.com/gotosleep.html](http://www.denversleep.com/gotosleep.html)

12 – National Institute of Alcohol Abuse and Alcoholism  
[www.niaaa.nih.gov/publications/aa41.htm](http://www.niaaa.nih.gov/publications/aa41.htm)

13 – National Research Council TCRP Report 81, Washington DC, 2002

14 - National Heart, Lung, and Blood Institute, Bethesda, Maryland, USA  
[www.nhlbi.nih.gov](http://www.nhlbi.nih.gov)

15 – Marcil, I.; Vincent, A. (2000) *Fatigue in Air Traffic Controllers: Literature Review*. Transport Canada, Air Navigation Services and Airspace.

16 – Neri, D.F.; Dinges, D.F.; Rosekind, M.R. (1997) *Sustained carrier operations: sleep loss, performance, and fatigue countermeasures*. NASA Ames Research Center; University of Pennsylvania School of Medicine.

17 – Air Traffic Services Safety and Quality Management System (February 1996) *Human Factors Guide*. Airservices Australia.

□ Articles from Authentic Health Fitness Australia  
[www.healthfitness.com.au/articles/sleep](http://www.healthfitness.com.au/articles/sleep)

□ Merck & Co. Sleep disorders  
[www.merck.com/pubs/mmanual\\_home/sec6/64.htm](http://www.merck.com/pubs/mmanual_home/sec6/64.htm)

□ Multimedia Sleep Disorder Library  
[http://insomnia.healthology.com/focus\\_index.asp?b=insomnia&f=sleep\\_disorders](http://insomnia.healthology.com/focus_index.asp?b=insomnia&f=sleep_disorders)

□ Sleep Deprivation Information  
[www.sleep-deprivation.co.uk](http://www.sleep-deprivation.co.uk)

□ Sleep Insomnia Program  
[www.iris-publishing.com/sleep.html](http://www.iris-publishing.com/sleep.html)

□ [www.sleepnet.com](http://www.sleepnet.com)

## APPENDIX - QUICK REFERENCE AID ON FATIGUE AND SLEEP HYGIENE

## **SLEEP TEST**

Check if any of the following applies to you:

- You were told that you snore loudly and often.
- You or others have observed that you stop breathing or gasp for breath during sleep.
- Feel sleepy or doze off while watching TV, reading, driving or engaging in daily activities?
- Have trouble staying alert during boring or monotonous situations when fatigue is often "unmasked"?
- Do you feel like you need a nap during the day?
- Have difficulty sleeping 3 nights a week or more (e.g., trouble falling asleep, wake frequently during the night, wake too early and cannot get back to sleep or wake unrefreshed)?
- Feel unpleasant, tingling, creeping feelings or nervousness in your legs when trying to sleep?
- Interruptions to your sleep (e.g., night-time heartburn, gastrointestinal distress, need to urinate, acid reflux, pain, bad dreams, sleep difficulties of family members, or an uncomfortable environment e.g., too much noise, light, or unpleasant temperature)?
- Tendency to be unreasonably irritable with co-workers, family or friends, and have difficulty concentrating or remembering facts?

*If you answered "yes" to any of these questions, you may not be getting enough good-quality sleep.*

## **SLEEP DIARY**

This Sleep Diary sample belongs to The National Heart, Lung, and Blood Institute, Bethesda (Maryland, USA). (14)

Name \_\_\_\_\_

		EXAMPLE					
Complete in AM	Date	Monday 4/10					
	Bed time (of previous night)	10:45 pm					
	Rise Time	7:00 am					
	Estimated time to fall asleep (previous night)	30 min					
	Estimated # of awakenings and total time awake (during previous night)	5 times 2 hours					
Complete in PM	Naps (Time & Duration)	3:30 pm 45 min					
	Alcoholic Drinks (Number & Time)	1 drink @ 8:00 pm 2 drinks @ 9:00 pm					
	List stresses experienced today	Flat tire Argued w/son					
	Rate how you felt today 1- Very tired/sleepy 2- Somewhat tired/sleepy 3- Fairly alert 4- Wide awake	2					
	Irritability 1- Not at all / 5- Very	5=very					
	Medications						

### SLEEP I.Q.

National Institutes of Health (National Heart, Lung, and Blood Institute)  
Test Your Sleep I.Q.

**The following true or false statements test what you know about sleep. Be sure to read the correct answers and explanations after taking the test.**

1. Sleep is a time when your body and brain shut down for rest and relaxation.

TRUE	FALSE
<input type="checkbox"/>	<input type="checkbox"/>

2. If you regularly doze off unintentionally during the day, you may need more than just a good night's sleep. \_\_\_\_\_ \_\_\_\_\_

3. If you snore loudly and persistently at night and are sleepy during the day, you may have a sleep disorder. \_\_\_\_\_ \_\_\_\_\_

4. Opening the car window or turning the radio up will keep the drowsy driver awake. \_\_\_\_\_ \_\_\_\_\_

5. Narcolepsy is a sleep disorder marked by "sleep attacks." \_\_\_\_\_ \_\_\_\_\_

6. The primary cause of insomnia is worry. \_\_\_\_\_ \_\_\_\_\_

7. One cause of not getting enough sleep is restless legs syndrome. \_\_\_\_\_ \_\_\_\_\_

8. The body has a natural ability to adjust to different sleep schedules such as working different shifts or travelling through multiple time zones quickly. \_\_\_\_\_ \_\_\_\_\_

9. People need less sleep as they grow older. \_\_\_\_\_ \_\_\_\_\_

10. More people doze off at the wheel of a car in the early morning or mid afternoon than in the evening. \_\_\_\_\_ \_\_\_\_\_

#### Answers to the Sleep I.Q. Quiz:

**1. False.** Although it is a time when your body rests and restores its energy levels, sleep is an active state that affects both your physical and mental well being. Adequate restful sleep, like diet and exercise, is critical to good health. Insufficient restful sleep can result in mental and physical health problems and possibly premature death.

**2. True.** Many people doze off unintentionally during the day despite getting their usual night of sleep. This could be a sign of a sleep disorder. Approximately 40 million Americans suffer from sleep disorders, including sleep apnea, insomnia, narcolepsy, and restless legs syndrome. An untreated sleep disorder can reduce your daytime productivity, increase your risk of accidents, and put you at risk for illness and even early death.

**3. True.** Persistent loud snoring at night and daytime sleepiness are the main symptoms of a common and serious sleep disorder, sleep apnea. Another symptom is frequent long pauses in breathing during sleep, followed by choking and gasping for breath. People with sleep apnea don't

get enough restful sleep, and their daytime performance is often seriously affected. Sleep apnea may also lead to hypertension, heart disease, heart attack and stroke. However, it can be treated and the sleep apnea patient can live a normal life.

**4. False.** Opening the car window or turning the radio up may arouse a drowsy driver briefly, but this won't keep that person alert behind the wheel. Even mild drowsiness is enough to reduce concentration and reaction time. The sleep-deprived driver may nod off for a couple of seconds at a time without even knowing it—enough time to kill himself or someone else. It has been estimated that drowsy driving may account for an average of 56,000 reported accidents each year claiming over 1,500 lives.

**5. True.** People with narcolepsy fall asleep uncontrollably at any time of the day, in all types of situations regardless of the amount or quality of sleep they've had the night before. Narcolepsy is characterized by these "sleep attacks," as well as by daytime sleepiness, episodes of muscle weakness or paralysis, and disrupted nighttime sleep. Although there is no known cure, medications and behavioral treatments can control symptoms, and people with narcolepsy can live normal lives.

**6. False.** Insomnia has many different causes, including physical and mental conditions and stress. Insomnia is the perception that you don't get enough sleep because you can't fall asleep or stay asleep or get back to sleep once you've awakened during the night. It affects people of all ages, usually for just an occasional night or two, but sometimes for weeks, months, or even years. Because insomnia can become a chronic problem, it is important to get it diagnosed and treated if it persists for more than a month.

**7. True.** Restless legs syndrome (RLS) is a medical condition distinguished by tingling sensations in the legs - and sometimes the arms - while sitting or lying still, especially at bedtime. The person with RLS needs to constantly stretch or move the legs to try to relieve these uncomfortable or painful symptoms. As a result, he or she has difficulty falling asleep or staying asleep and usually feels extremely sleepy and unable to function fully during the day. Good sleep habits and medication can help the person with RLS.

**8. False.** The human body's biological clock programmes each person to feel sleepy during the nighttime hours and to be active during the daylight hours. So people who work the night shift and try to sleep during the day are constantly fighting their biological clocks. This puts them at risk of error and accident at work and of disturbed sleep. The same is true for people who travel through multiple time zones quickly; they get "jet lag" because they cannot maintain a regular sleep-wake schedule. Sleeping

during the day in a dark, quiet bedroom and getting exposure to sufficient bright light at the right time can help improve daytime alertness.

**9. False.** As we get older, we don't need less sleep, but we often get less sleep. That's because our ability to sleep for long periods of time and to get into the deep restful stages of sleep decreases with age. Older people have more fragile sleep and are more easily disturbed by light, noise, and pain. They also may have medical conditions that contribute to sleep problems. Going to bed at the same time every night and getting up at the same time every morning, getting exposure to natural outdoor light during the day, and sleeping in a cool, dark, quiet place at night may help.

**10. True.** Our bodies are programmed by our biological clock to experience two natural periods of sleepiness during the 24-hour day, regardless of the amount of sleep we've had in the previous 24 hours. The primary period is between about midnight and 7:00 a.m. A second period of less intense sleepiness is in the midafternoon, between about 1:00 and 3:00. This means that we are more at risk of falling asleep at the wheel at these times than in the evening—especially if we haven't been getting enough sleep.

- 9-10 Correct** → Congratulations! You know a lot about sleep. Share this information with your family and friends
- 7-8 Correct** → Very Good.
- Fewer Than 7 Correct** → Go over the answers and try to learn more about sleep.



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