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Annual Command Individual Safety Awards Issue

Focus

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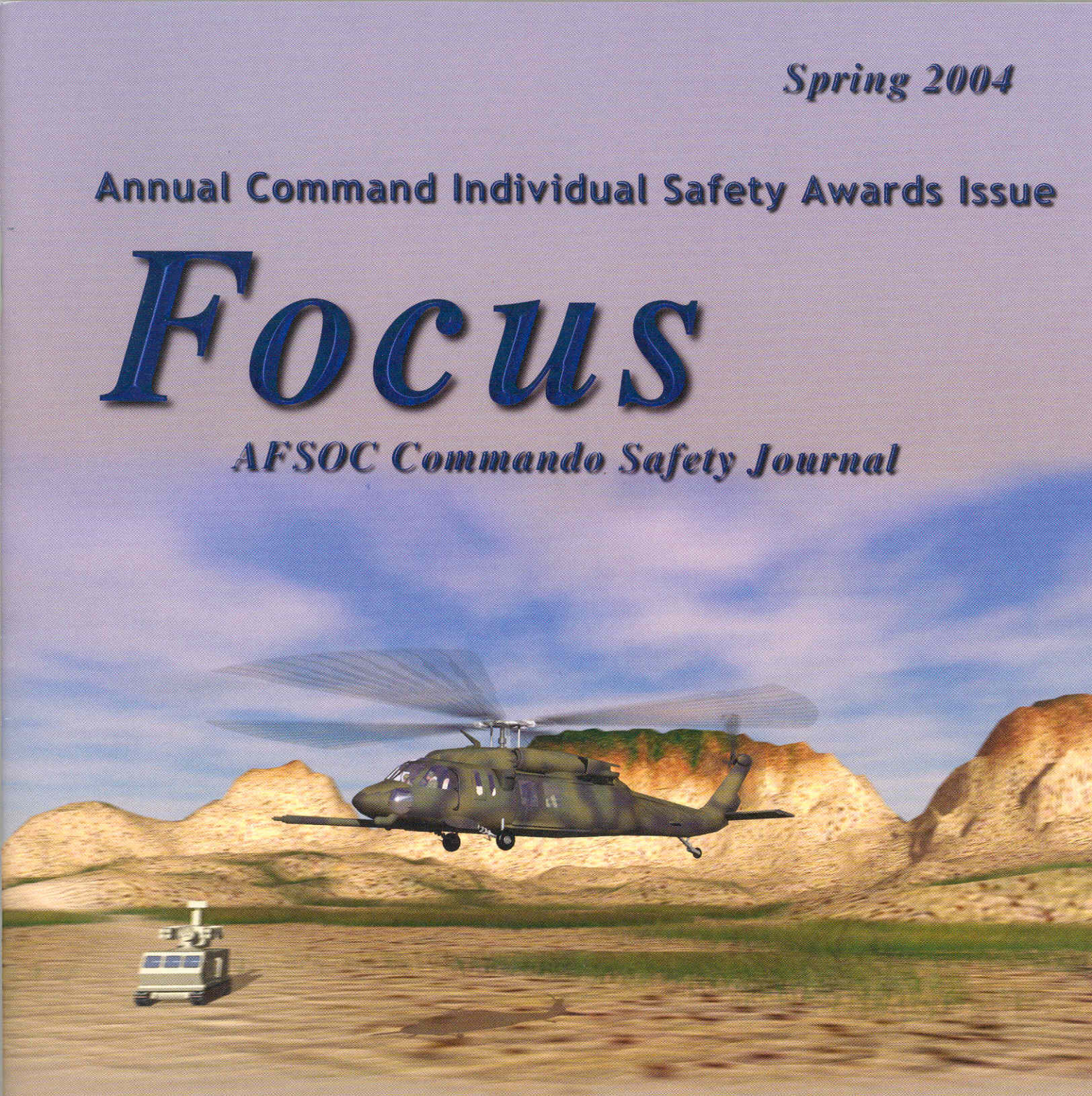

AFSOC Safety Introduces the Digital Eagle Program

Jet Lag and Shift Lag: How Can We Maintain Performance?

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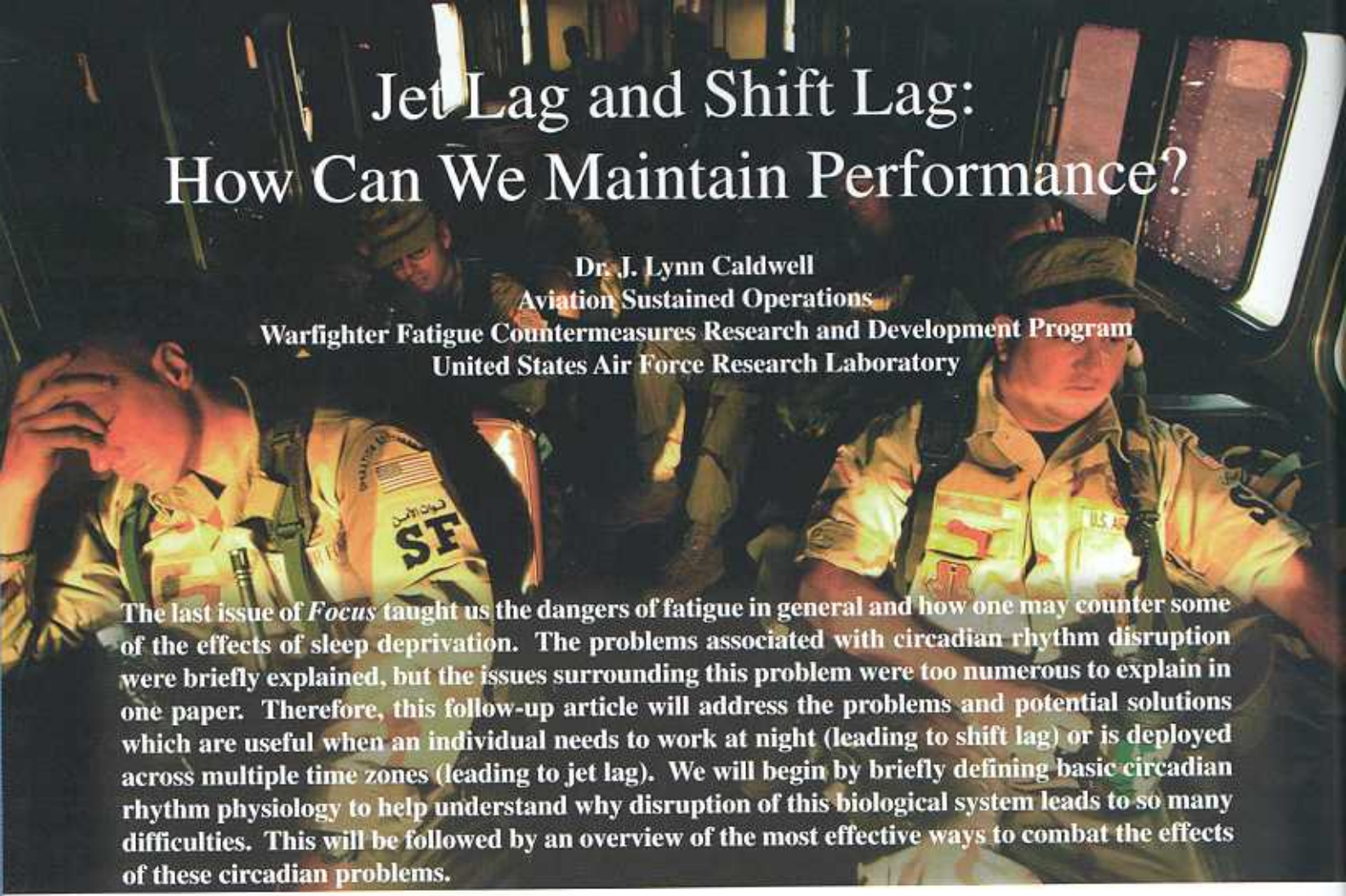


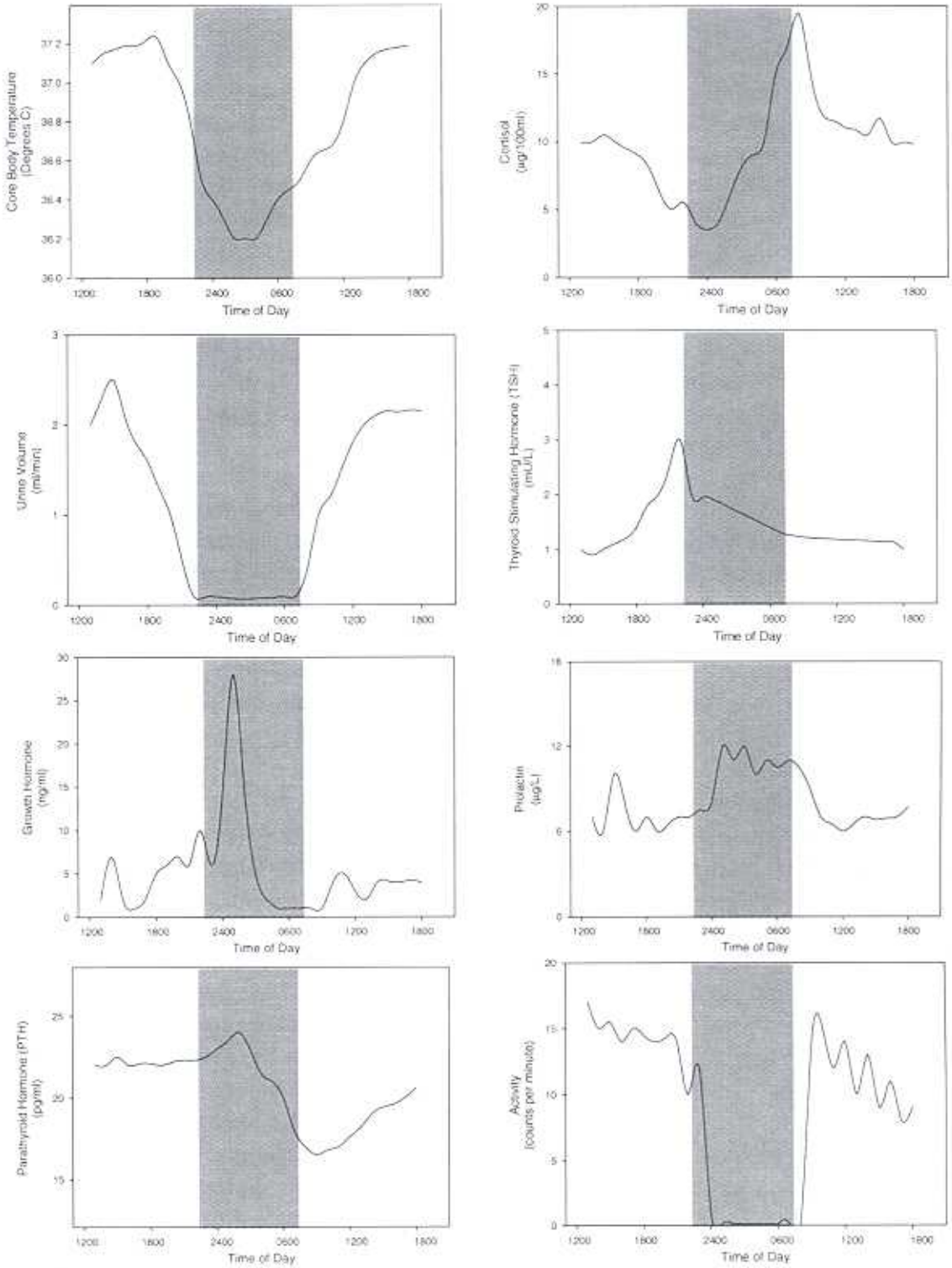
The last issue of *Focus* taught us the dangers of fatigue in general and how one may counter some of the effects of sleep deprivation. The problems associated with circadian rhythm disruption were briefly explained, but the issues surrounding this problem were too numerous to explain in one paper. Therefore, this follow-up article will address the problems and potential solutions which are useful when an individual needs to work at night (leading to shift lag) or is deployed across multiple time zones (leading to jet lag). We will begin by briefly defining basic circadian rhythm physiology to help understand why disruption of this biological system leads to so many difficulties. This will be followed by an overview of the most effective ways to combat the effects of these circadian problems.

Circadian rhythms explained

Each of us has an internal mechanism called a biological clock that mediates the biological and psychological processes that naturally vary over the 24-hour day. These processes are termed "circadian rhythms" (Latin for "about a day"). Examples of some of the rhythms are body temperature, hormone secretions, and alertness, but there are literally thousands of processes within us that have a daily pattern. A sample of just a few of the body's internal circadian rhythms is shown in the graphs below. These are kept in sync by a number of cues, called "zeitgebers" (German for "time cue"), that naturally occur within our environment. Light is the primary zeitgeber responsible for maintaining consistently synchronized internal rhythms, but other zeitgebers such as social factors (meals, work activity, etc.) contribute to the stability of our daily cycles as well.

The human brain is "hard-wired" for approximately a 24-hour day, programmed to be asleep during the dark hours and awake and active during the daylight hours. With the earth's 24-hour rotation, the cycle of light and dark maintains our internal rhythms on this daily pattern. Like an orchestra, the body's rhythms fluctuate throughout the day, with some peaking while others dip, but they all work together in harmony to keep the body running smoothly. However, when something disrupts this smooth orchestration of rhythms, problems occur.

Some of the symptoms of a disrupted circadian rhythm, called circadian desynchronosis, include fatigue, malaise, sleepiness, lack of motivation, confusion, insomnia, and digestive disorders. Everyone who has had experience with frequent OCONUS deployments can easily relate to all of these. Such problems occur because of the disconnect between what the environment is telling the body to do and what the body is programmed to do. In the modern military environment, such disconnects generally occur either because of shiftwork or the requirement to rapidly travel across several time zones.



Shift lag

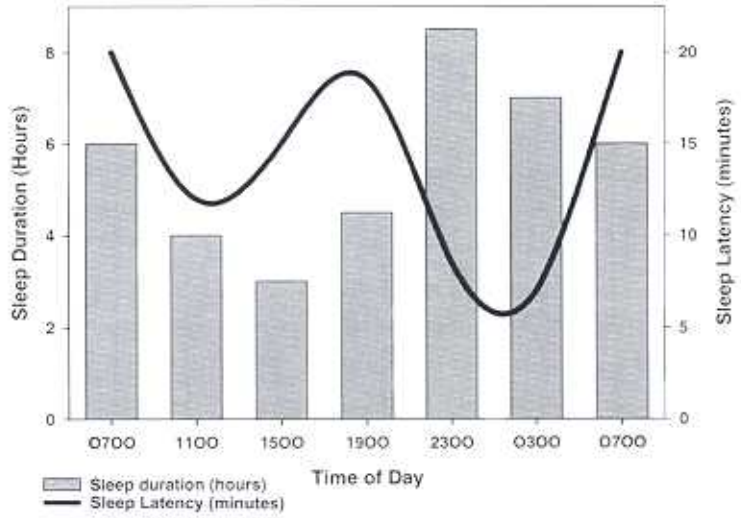
Everyone who works nonstandard schedules knows how the requirement to sleep outside the normal sleep period and stay awake outside the normal activity period affects our whole life. Shift lag produces the same symptoms of fatigue, sleepiness, etc. that occur in jet lag, but the problems usually last longer since the environmental cues are often in opposition to optimal circadian rhythms no matter

how long you stay on the same shift. When a person is involved in night operations, the sleep period, by default, will occur during the day since daytime sleep is essential for successful nighttime performance; however, all the environmental and social timing cues are saying that daytime sleep is not normal and should be avoided. Physiologically, the body is becoming alert during the daytime with the exposure to sunlight, however the night worker is on the way home in preparation to sleep. Socially, friends and family are preparing for work in the morning when the night worker is going to bed. Then at night when the night worker is starting the next shift, it is dark, and this is signaling the brain to prepare for sleep. And the other environmental cues right before night work aren't helping matters either. Stores are closing and everyone else is sleeping. In addition, the psychological and social impact of being on a sleep/wake cycle that is opposite to the rest of society adds to the physiological impact of adjustment to night operations and leads to even more problems for personnel on the "graveyard shift." On top of all of this, the pilot and crew who fly at night do not have the advantage of being in a well-lit room while working; instead, the cockpit environment is dark and quiet, making it very hard to stay awake. If you fly a single-pilot aircraft, conversation with other crewmembers is not even available to help maintain alertness.

All in all, working nonstandard hours is fraught with difficulty, and the reasons are almost entirely physiological. Sleep is very difficult to obtain during the daytime hours, mainly due to the fact that the body is set to be alert during the daylight. When the sun is up, body temperature is rising, and hormone levels are shifting to mobilize energy to the body and brain. While sleep deprivation from being awake the preceding night tends to promote rapid sleep onset during the day, circadian factors quickly start to disrupt sleep maintenance as soon as some of the sleep pressure subsides. After about 3-4 hours of daytime sleep, most night workers awaken and find it very difficult to return to sleep and remain asleep for very long. Most give up after a while and decide to engage in normal daytime activities until it's time to report for work. Unfortunately, this exposure to light and activity makes the long-term situation worse because these cues keep the body's clock on a daytime waking schedule, and this leads to further difficulty sleeping during the next day and then staying awake for work at night.. The cycle continues until either fatigue sets in so heavily that the worker eventually collapses into sleep (hopefully while at home), or the period of night work ends, permitting a return to daytime work and nighttime sleep.

Daytime sleep problems aren't just "all in your head"

To better understand the difficulties faced by nightworkers, consider the fact that much of the ability to sleep at any point in the 24-hour cycle depends on the time at which sleep is initiated. Generally, when a person's sleep opportunity occurs in the early morning hours, for example before 0400, it is relatively easy to fall asleep and stay asleep, allowing more continuous slumber before the circadian rhythm of alertness kicks in. However, waiting until mid to late morning creates problems primarily because sleep is more difficult to maintain since the body's rhythm of alertness is rising, setting you up for short sleep. For example, when trying to sleep at 1100 in the morning, it may take only 10 to 15 minutes to go to sleep due to the high sleep drive that resulted from being



awake all night, but the sleep only lasts on average less than 5 hours. However, when starting to sleep at 2300 at night, it takes on average less than 10 minutes to fall asleep, and the sleep duration is about 8 hours because this sleep time coincides well with the body's natural rhythms. The circadian pressure to sleep is strong at 2300 at night, but is very weak at 1100 in the morning. This makes it very difficult for night workers to obtain the recommended 8 hours of sleep during daylight hours.

Staying awake at night is difficult too

It is easy to see that getting enough sleep during the day is difficult, but staying alert during the night is also a tough problem. The zeitgebers and the body's responses to these cues are saying rest and sleep, while the work schedule is saying wake up and do the mission. Of course, nighttime is when our bodies are biologically programmed to be asleep. The hormones are preparing the brain for sleep, and body temperature is falling in preparation for the upcoming state of inactivity. Normally, this is a good thing (when you're on day shift), but all of these factors make it very difficult for people on the night shift to stay alert for more than a few hours before sleepiness becomes overwhelming, usually between 0200 and 0600. This is the case even when daytime sleep is fairly good. For most people, it is a real battle between willpower and physiology to try to remain alert late at night and during the predawn hours, and this battle is often lost as indicated by the number of unintended sleep episodes that occur on the night shift. Research has repeatedly shown that the number of involuntary sleep lapses is much higher in the early morning hours than at other times of the day. In addition, accidents are more likely to occur, errors in performance are more frequent, mood is poorer, and motivation is lower at night than during the day. In fact, some of the most notorious industrial and transportation mishaps have in part been chalked up to fatigued night workers. Included in this list is the grounding of the Exxon Valdez, the space shuttle Challenger disaster, the crash of a Korean Air 747 in Guam, the American Airlines Flight 1420 mishap, and the near meltdown at Three Mile Island nuclear power plant.

Night work not only poses imminent safety risks, but it seems to impair immune-system functioning as well, making night workers more illness prone than their daytime counterparts. Outside of work, the health of night workers is further threatened by the high level of sleepiness that exists during the drive home because this increases the risk of a vehicular accident. Drowsy drivers are responsible of approximately 1,500 fatalities and over 100,000 highway accidents every year in the U.S. alone! All in all, shift work creates a variety of difficulties in terms of performance, safety, and general well being, both on the job and off.

But night workers are not the only ones who have to fight a circadian battle for on-the-job alertness. People who report to work early in the day (before 0600-0700) can experience alertness problems similar to those encountered by the personnel who staff the more typical night shift. Although they have the advantage of being on the job during daylight hours, they have the disadvantage of being sleep deprived prior to work because of a restricted night of sleep. For physiological reasons, people experience a great deal of difficulty falling asleep early in the evening. When your mission starts early in the morning, this leads to a shortened sleep duration that is less than the recommended 8 hours. Further problems occur when waking up at 4:00 a.m. since this is the low point in the circadian cycle. Together, these factors lead to grogginess during the beginning of work (from sleep inertia) and drowsiness towards the end of the shift (from sleep deprivation). This is why early schedules should be staffed with those individuals who are naturally more alert in the morning.

As you will see in the next section, adaptation to new work schedules poses short-term problems similar to those caused by jet lag. However, the long-term adaptation to a new time zone is generally easier than adjusting to a nonstandard sleep/wake schedule. Unlike jet lag where environmental cues can help to resynchronize the body's clock with the schedule of the new time zone (if personnel are allowed to remain in the new location long enough), shift lag tends to persist because the normal

external timing cues remain in opposition to the body's new work/rest schedule. The sun is out and the world is active while the night worker is trying to sleep, and the opposite is true while the night worker is getting ready for work. Careful planning of schedules will assist in adjustment to night duty, but complete adjustment is difficult or even impossible. After a brief discussion of jet lag, several strategies for shift workers will be presented.

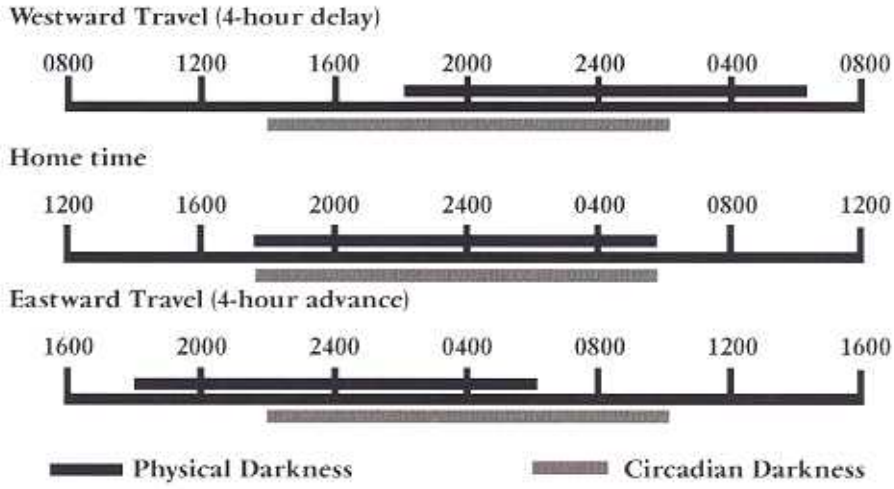
Jet lag

Another way that people encounter circadian disruptions is through the rapid crossing of multiple time zones. When traveling from one time zone to another, the body's rhythms and the time-giving cues supplied by the outside world become out of sync, and the syndrome of "jet lag" occurs. Technically, jet lag is a problem when the environmental time cues are at least 3 hours different from the timing of the biological clock. This circumstance can occur by either delaying the environmental time, as when traveling westward, or advancing the environmental time, as when traveling eastward. For example, if one travels from New York City to Los Angeles, the 3-hour time difference causes a delay in the environmental time, creating a number of problems. First, mealtime and bedtime occur later (i.e., are *delayed*) with respect to their normal biological clock time. A 1930 dinner in Los Angeles occurs at 2230 body time for a New Yorker, and a 2300 bedtime in Los Angeles is at 0200 body time. Usually this delay is not a significant problem for most people due to the fact that the free running natural rhythm of our body is slightly longer than 24 hours. This makes the adjustment to a longer day relatively easy. Exposure to the environmental zeitgebers also helps maintain alertness and keeps the body's rhythm in sync with the environment. In other words, it's easier for someone to stay awake later than usual (according to the body clock) because there is plenty of normal evening activity in the new time zone, and this helps to promote alertness later in the day. The problem arises when the New Yorker's natural wake-up time of 0700 (according to the internal body clock) coincides with a local Los Angeles time of only 0400. Now, the jet-lagged traveler is trying to sleep well past his body's normal wakeup time. It is generally difficult to sleep much later than usual, and this means that our traveler will end up crawling out of bed before sunrise. Since rise time is as much as 3 hours earlier despite the fact that bedtime was 3 hours later than usual, sleep restriction occurs from the limited time in bed, and this creates alertness problems later in the day. However, adjustment to the later wake-up time usually occurs within a few days, and in the meantime, alertness during the daylight hours is facilitated by work or social activities, meals, and sunlight exposure, so the problems associated with the type of delayed time change described here are relatively minor.

A more difficult adjustment is required when the environmental clock is advanced, such as when someone flies eastward. In this case, when someone travels from Los Angeles to New York, the 1930 dinner in New York occurs at 1630 body time, and a 2300 bedtime in New York is only 2000 body time. This advanced timing of meals and sleep creates difficulty, especially in terms of sleep initiation. In this case, the early bedtime puts the start of the sleep period at a time prior to the opening of what has been called the "sleep gate," or the period of time in which you can most readily fall asleep. The body's chemicals are not set to allow for the earlier sleep onset (before the "gate" opens) dictated by the new time zone, and this results in the familiar problem of lying in bed becoming frustrated at the inability to fall asleep even though the local clock time says it's very late. Then when the local time in New York says it's time to get up at 0700, it's only 0400 according to the body clock set on Los Angeles time. Of course, this leads to the sleepy, muddled feeling, called "sleep inertia," that is especially noticeable when trying to wake up so early in the morning. Eventually, adjustment to the earlier sleep times and wake-up times (according to the body clock) will occur, however, the change after an advance in the schedule usually takes longer than the readjustment after a rhythm delay.

How long does this jet lag last?

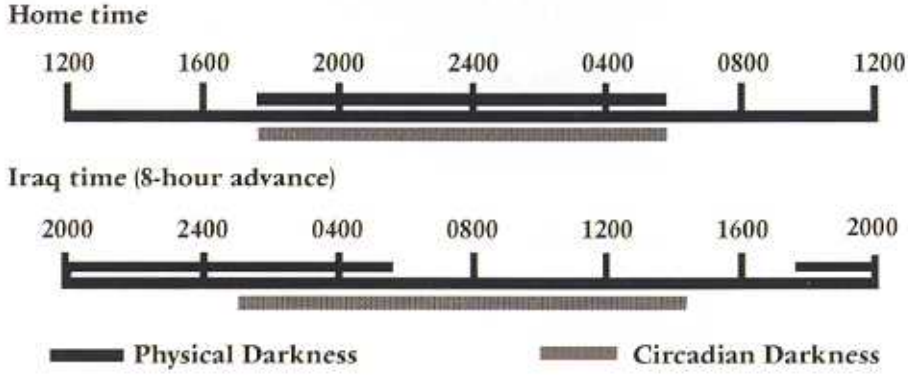
Everyone adjusts to new schedules at a different rate. Research indicates that depending on the circumstances, some people can adapt to a 5- to 8-hour time change in as little as 2 days, but more often it can take as long as a week or two. The rule of thumb is that it takes about 1 day of adjustment for every hour of time-zone change; however, this will depend on the direction of the time change and the degree of exposure to the new environmental timing cues. Note from the diagram below how eastward travel requires early sleep initiation and early awakening, both of which are difficult for the body to



accommodate. However, westward travel presents a situation that is more like what many of us already do on our off-duty time — staying up later at night and sleeping later the next morning. Westward transitions (schedule delays) generally are easier for the body to accommodate.

The scenarios discussed above demonstrate only mild cases of jet lag since there is only a 3-hour disagreement between the environmental zeitgebers and the biological clock. For those who were deployed into Iraq, the time difference between the Eastern time zone (Washington DC) and Iraq time is 8 hours in the eastern direction (a phase advance). Of course, if you were deployed from other time zones in the U.S., then the phase advance is even greater (i.e., 11 hours from the Pacific coast). The adaptation to this new time zone may have taken at least a week before alertness levels were close to what they were at home, and it may have taken 2 weeks or more for all the internal rhythms to synchronize – temperature, hormones, digestion, etc. – and a feeling of normality to return. Those of you who were deployed can get an idea of what you were fighting physiologically during the first few days of deployment. As you can see in the diagram below, if you were able to go to bed around 2300 Iraq time, this was only 1500 body clock time. The fatigue from the trip probably helped you to sleep the first night, but a battle with circadian rhythms occurred on the following nights. If your wake-up time was at 0500 in Iraq, this corresponded to a 2300 body clock time, when you would normally have just begun your sleep period. Needless to say, this led to difficulty awakening and staying awake during the next day (when your body was used to being asleep). Eventually all the rhythms synchronized with the local time cues and resynchronized with one another, but until then, problems of sleeplessness when trying to sleep, difficulties with sleepiness when trying to stay awake, and the discomfort from digestive disorders and irritable mood were constant reminders that reprogramming the body's internal clock is no easy feat. Trying to perform the mission at a time when the body wanted to sleep got pretty

difficult, especially when the insomnia from the night before sapped whatever reserve capacity was available. No wonder fatigue-related performance problems became such a serious threat to operational readiness!



Some countermeasures for shift lag

It has been well established that even the most simple jobs suffer from degraded alertness at night, and shift workers obviously must be prepared to deal with the sleepiness and performance problems that are characteristic of their less than optimal work schedules. While no amount of effort or planning will change the physiological basis for the 24-hour rhythms that underlie the well-known alertness and performance decrements, several strategies will help to deal with night work.

While one cannot completely trick the body into being alert during the night since there is a strong physiological drive for sleep when it's dark outside, the human body can adapt somewhat to staying awake at this difficult time. However, it takes many days of sticking with strict schedules before adjustment occurs, and many shift workers find that they're readjusting just in time to rotate off the night shift again. However, next time you're scheduling work shifts for subordinates (or when you're stuck with night duty yourself) try these techniques:

• *When possible, reduce mental demands for night workers.* Remember that everyone on the night shift is likely not to be as alert as usual, so do not assume that some unusual decision or action or the omission of some routine procedure was actually intended. Double check everything, particularly when safety is a factor (as is the case in most aviation-related environments). Try to ensure that the time spent doing the same task is punctuated by breaks or different work requirements if at all possible (reducing boredom may help to reduce the impact of fatigue). When the goals for the night are accomplished, leave work and get some rest. Prolonged work periods are very difficult for those who are already struggling to stay awake for night duty. Commanders should be especially sensitive to this issue and allow the night workers to get rest instead of attending meetings, performing administrative duties, etc., that could possibly be conducted at a later time or by another individual who is rested.

• *Use caffeine carefully; wait until you need a boost.* Studies have shown that caffeine is a powerful stimulant, but it is easy to become tolerant to its effects. A good way to maintain caffeine's alerting effects is to remove it from your daily intake until it is needed to enhance alertness. Then consumption of caffeine will continue to be beneficial when trying to stay awake during those early morning hours when on night operations.

• *Use social interactions and physical activity/postural changes to help stimulate your environment.* Even though fatigue may reduce the desire to interact with colleagues, talking with someone can produce the stimulation needed to help curb sleepiness. Research has shown that changing posture can

also improve alertness. The simple act of changing from a sitting position to a standing position can remove the feelings of sleepiness, at least for a short while. If night duty involves flying an aircraft, posture change may not be possible. However, when the opportunity presents itself, take advantage of the alerting effects of just moving around. If you're a helicopter pilot, avoid hot refuels in order to get out of the seat for a while during those long night missions.

• *Stay cooler than usual.* The slight discomfort of a cool environment can help one to remain alert better than a comfortable, warm environment. If the uniform allows, leave off coats or extra clothing that may keep you warm, but also may lead to higher levels of sleepiness.

• *Prepare in advance for changes in sleep schedules by gradually adjusting your sleep time.* In many cases, the work load does not permit gradual adaptation to a new shift, but when it does, gradually stay up later in the evening and sleep later in the morning to prepare for the requirement of staying up all night during night operations. Even partial adaptation to a late work schedule is better than none.

• *If using short split shifts, schedule off-duty times for periods when sleep is naturally easy to obtain.* Commanders and planners should plan time off for pilots and crews during times that coincide with a circadian phase that is conducive to sleep. In split-shift operations, it is great to provide some time to grab a few hours of restorative slumber, but if the sleep opportunity occurs at 1700, it may not be of much use since this is a time of day when most people are normally alert, making sleep difficult. Instead, it is best to schedule the break for the early afternoon, the pre-dawn hours, or the late-night hours when sleep is actually possible.

• *Ensure clockwise transitions when changing work schedules and make sure personnel have adequate time for sleep before reporting to the next duty shift.* Whenever possible, forward (or clockwise) rotations should be used. This means starting with the normal dayshift, then moving to an evening shift, and finally to a night shift rather than the other way around. This is much easier for the body to handle because it takes advantage of our natural ability to delay sleep as opposed to fighting our natural inability to fall asleep earlier than usual. A forward rotation strategy takes advantage of the same physiological propensities that make it easier to readjust to a westward time-zone change than to an eastward transition.

• *Consider the effects of the number of days that someone remains on a shift.* There are two schools of thought on this matter. One suggests that shift rotations should be kept to 2-3 day durations (rapid rotation), while the other suggests that any new work shift should be maintained for at least 5-7 days (slow rotation). Support for the rapid rotation strategy comes from the fact that full adaptation to the shift change is unlikely anyway, and the longer someone remains on the night shift, the higher his cumulative sleep debt will become. Proponents of this strategy feel that keeping the night rotation short will prevent fatigue from building to dangerous levels before a normal day shift is resumed. Support for the slow rotation strategy is based on the possibility that people can at least partially adjust to the new schedule if they use appropriate techniques and remain on the new schedule long enough. Although short-term adaptation problems may occur, in the long run, alertness will improve as the circadian rhythm adjusts and the ability to obtain adequate daytime sleep improves.

All of the above strategies are helpful for improving alertness and performance during nighttime operations. But what about improving the sleep that comes before or after the night mission? After a night of work, one must strive to recover as much as possible by obtaining the most restful sleep before the next period of night duty. While it will be difficult to sleep during the day, there are some strategies that definitely will help.

• *Avoid caffeine 4-6 hours before bedtime.* While caffeine consumption during the night shift will boost alertness levels, the prolonged impact of caffeine can interfere with subsequent sleep. Caffeine's effects generally do not start to decline until approximately 4 hours after consumption. While most of

us equate coffee with caffeine, remember other substances contain caffeine as well — most sodas, tea, and chocolate, as well as some of the health drinks available. In addition, some medications contain caffeine or other stimulants, so check to make sure you're not taking something that will create problems when bedtime rolls around. If prescription medications have an alerting ingredient, talk with your physician about changing the timing of when the medication is taken. Knowing when to use caffeine and still have it not interfere with recovery sleep is a difficult, but important, balance to achieve.

• *Avoid sunlight after a night shift and during the day when trying to sleep.* As discussed earlier, sunlight is a very important cue in synchronizing the body's functions to a daytime alertness/nighttime sleep rhythm. If sunlight can be avoided at the end of the night shift, the ability to sleep during the day will be enhanced, leading to a faster adaptation to working at night. If one awakens during the day with the intent of returning to sleep, stay in the dark room, keep activities to a minimum, and sleep will be relatively easy to resume.

• *Relax before sleep time.* The wind-down time between mission completion and sleep is important, regardless of whether work occurs during the day or at night. For the night crew, getting ready for sleep as early in the morning as possible will lead to a longer sleep period, but time is still needed to unwind and forget the worries of the work world. Keeping a bedtime ritual is good sleep hygiene, even if the sleep period occurs during the day.

• *Avoid alcohol for at least 3 hours before bedtime.* While alcohol relaxes and sedates many people, leading to faster sleep onset, it will significantly reduce sleep quality later on in the sleep period. Since sleep quality is what we are trying to improve, any substance which disrupts sleep, causing awakenings and other sleep disturbances, should be avoided.

• *Avoid strenuous exercise at least 3 hours before bedtime.* Exercise raises the body temperature, and this tends to reduce sleepiness. Some people may be able to sleep immediately following physical exercise, but this usually is not the case. Don't engage in PT right before bedtime unless you are sure the exercise does not disturb your sleep. Remember that daytime sleep is more fragile than nighttime sleep, and this means that an activity that does not disturb nighttime sleep may cause problems when trying to sleep during the day.

• *Get a minimum of 6 hours of sleep; use supplemental naps to obtain as much sleep as possible before the night's mission begins.* As discussed in last issue's article, the recommended length of sleep is 8 hours. Unfortunately, it is well documented that daytime sleep is shorter than nighttime sleep, and anything less than 6 hours will in itself lead to sleepiness the next day. Since daytime sleep tends to be short, it is worth the effort to nap a while prior to reporting to work at night. This nap accomplishes two objectives – it increases the overall amount of sleep obtained over the 24-hour period, and it pushes the end of the most recent sleep period closer to the time when the night worker should be awake.

• *When possible, sleep in your regular bedclothes and in your usual bed.* The psychological impact of sleeping in your normal environment will allow better sleep onset. This also goes with the ritual of getting ready for bed and creating the setting for sleep.

• *Do your best to find a comfortable mattress and pillow.* Many people forget that the surface on which they sleep is important for the quality of sleep. If your mattress and/or pillow are uncomfortable, sleep will not be restful, regardless of all the countermeasures one institutes.

• *Make the bedroom cool and very dark.* Of course, if you are stuck in a tent in the desert, there won't be much you can do about the sleep environment. However, the individual at home has more control over where he sleeps. Remember that a cool room combined with warm covers or bedclothes will enhance comfort and promote better sleep. In addition, the room should remain very dark, not just dim, for the entire sleep period. Once again, remember that light is a powerful alerting cue, so it's important to maintain a dark room until the sleep period is complete.

• *Remove the phone from the room and discourage daytime visitors.* Daytime is when most people

are conducting business, so telephones ringing just when you are getting to sleep will be pretty disruptive.. Disconnect the doorbell or hang a sign indicating a shift worker is sleeping to avoid salesmen or others visiting your home or quarters.

• *Use earplugs and a masking noise like a fan to cover outside distractions.* External noises resulting from daytime activity can adversely impact sleep quality. While you may not be able to prevent mail carriers, trash collectors, delivery trucks, etc., from continuing their work, you can block the noise they make by wearing earplugs and mask the noise with a continuous sound like a fan. The radio and television are not good masking noises because of the variability in the volume of the sounds which can disrupt sleep as much as the outside noise you are trying to mask. In the field, commanders can help night operators avoid interruptions by placing day sleep tents away from activities as much as possible, and reminding everyone that night workers should not be disturbed.

• *Develop a sleep schedule and make it a priority.* It is up to each individual to make time for sleep. Family and friends may have social activities which you would like to attend, but it is important that you also get enough sleep to perform safely on the job at night. Communicate with family and friends your need to sleep and your sleep schedule so they will be able to schedule time with you which will allow you to sleep as well as socialize. When on duty, both individual personnel and their commanders must emphasize the importance of sufficient sleep. Plan for it, insist upon it, and make it happen!

• *Consider the use of sleep medications to help sleep during the day.* Sleep medications are sometimes the only effective way to induce sleep at a time that is contrary to the body's clock. In many military situations, these medications are sometimes permitted since modern sleep aids are effective, short-acting, and largely devoid of problematic side effects. A pilot should definitely consider using sleep-inducing medications if the commander and the unit flight surgeon authorize them.

Some countermeasures for jet lag

The basic strategies for getting the body's rhythms adjusted to a new work/sleep schedule after traveling to a new time zone are the same as the ones suggested for readjusting shift workers. Luckily, however, it should be easier to adjust to a new time zone than to a new shiftwork schedule because, as mentioned earlier, the environmental cues are instrumental in changing the body's rhythms, and most of these are on your side in the new time zone. However, before implementing such a change, a decision must be made about whether it is worth it to readjust the circadian rhythm to the new time cues. If only 1-3 days will be spent in the time zone, the best strategy is to try to remain on the original schedule. This is preferable to the discomfort, fatigue, and sleep deprivation that will result from attempting to readjust the body's rhythms for a couple of days just to turn around and revert to the original schedule before true adjustment is even close to occurring. However, if it looks like more than 3 days will be spent in the new time zone, a planned adaptation routine should be undertaken.

• Consider the use of medications to aid sleep and/or alertness until the body adjusts to the new time zone.

• Quickly adjust meal, activity, and sleep times to the new schedule.

• Adjust the timing of sunlight exposure to maximize the amount of light in the morning while minimizing the amount of light in the afternoon or early evening.

• To overcome sleep problems, make efforts to optimize the sleep environment in accordance with the suggestions presented in the last *Focus* in the article dealing with sleep deprivation.

• Avoid heavy meals before bedtime since these may create sleep-disrupting gastrointestinal disturbances.

• If TDY in a fixed-base facility or hotel, try a hot bath and relaxation exercises right before bedtime. Implement all of the guidelines for good sleep habits (see the previous article).

• Be prepared to use caffeine upon awakening to help overcome the grogginess that will result from

a shortened sleep period and, from the standpoint of the body's clock, an early-morning awakening.

•Melatonin has been found to be useful for some people in establishing and maintaining the timing of the circadian system. The body normally starts to secrete melatonin around the beginning of the normal sleep cycle, and the levels of melatonin are greatest during the sleep period, so these are the times that should be targeted for melatonin supplementation. For the aviator, melatonin administration is not authorized by the Air Force since melatonin produces sleepiness in many people. A sleepy pilot at the controls is what we are trying to avoid! However, if you find that you will be staying at your destination for several days of rest, then melatonin administration may work for you.

The bottom line

The bottom line is that the body will revolt when the circadian rhythm is disrupted for any reason. While there are strategies to help adjust to new time zones and new work schedules, the circadian system is fragile and will be slow to change. Some strategies for adjustment are helpful, but remember that continuous disruptions in work and sleep cycles lead to poor mood, poor performance, increased sleepiness, and problems with health that will continue to build until a normal, consistent day schedule is restored. However, taking care of some of the manageable variables will lead to improved safety on the ground and in the air, better work performance, better relationships with family and friends, and better general health.◆

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