JET LAG

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I. INTRODUCTION

It's hard to say for sure who coined the term, but a quick newspaper database search shows that "jet lag" first appeared in a Los Angeles Times article on February 13, 1966. "If you're going to be a member of the Jet Set and fly off to Katmandu for coffee with King Mahendra," wrote Horace Sutton, "you can count on contracting Jet Lag, a debility not unlike a hangover. Jet Lag derives from the simple fact that jets travel so fast they leave your body rhythms behind."

II. DEFINITION

Jet lag, also called jet lag disorder, is a temporary circadian rhythm sleep–wake disorder that may occur after rapid travel across multiple time zones. The traveller's internal biological clock remains aligned with the departure time zone while the external environment follows the destination's local time. This mismatch can produce difficulty sleeping at the desired time, excessive sleepiness, fatigue, impaired concentration and gastrointestinal symptoms. Jet lag is more than ordinary tiredness after travel because it specifically involves a temporary misalignment between internal circadian timing and the new day–night schedule (Centers for Disease Control and Prevention [CDC], 2025).

III. BIOLOGICAL RHYTHMS: MEANING AND TYPES

A biological rhythm is a recurring pattern in a physiological, behavioral or biochemical function. These rhythms help the body coordinate activity with predictable changes in the environment. The term circadian comes from Latin words meaning "about a day"; a circadian rhythm follows a cycle of approximately 24 hours. Circadian rhythms influence sleep and wakefulness, body temperature, hormone secretion, appetite, digestion, alertness and many other functions. Light and darkness are the strongest environmental time cues for the human circadian system, although meals, physical activity, social routines and temperature can also contribute (National Institute of General Medical Sciences [NIGMS], n.d.).
The major categories of biological rhythms are:

- Circadian rhythm: approximately 24 hours. Examples include the sleep–wake cycle, daily melatonin secretion and the daily pattern of body temperature.
- Ultradian rhythm: repeats more than once in 24 hours. Examples include the alternating NREM–REM cycles during sleep and pulses of secretion of certain hormones.
- In radian rhythm: lasts longer than 24 hours. The menstrual cycle is a common example.

Jet lag primarily disrupts circadian timing. The body's internal clock does not instantly reset when a person crosses time zones; it needs time and appropriately timed environmental cues to adjust.

IV. THE BIOLOGICAL CLOCK AND CIRCADIAN REGULATION

The principal circadian pacemaker in humans is the suprachiasmatic nucleus (SCN), a small group of nerve cells located in the hypothalamus. Specialized light-sensitive cells in the retina detect environmental light and send signals through the Retin hypothalamic pathway to the SCN. The SCN uses this information to synchronize daily rhythms in the brain and body. It also influences the timing of melatonin secretion by regulating neural pathways to the pineal gland. In this way, the light–dark cycle helps the internal clock stay aligned with the external day (NIGMS, n.d.).
The circadian system is not the only factor that controls sleep. Sleep timing reflects the interaction of

two processes. First, the circadian process creates a daily pattern of alertness and sleep propensity. Second, homeostatic sleep pressure builds the longer a person remains awake and decreases during sleep. After long travel, a person may feel sleepy because of sleep loss while the circadian clock is still signaling wakefulness, or may be alert at night when the destination schedule requires sleep. These two processes help explain why jet lag can affect both sleep timing and daytime functioning.

Light exposure has a phase-shifting effect: depending on when it occurs in relation to the internal body clock, it can move circadian timing earlier (a phase advance) or later (a phase delay). This timing matters. In general, appropriately timed morning light can advance the clock, while evening light can delay it; however, the optimal schedule depends on the direction of travel and the number of time zones crossed. Incorrectly timed light may delay adaptation rather than improve it (CDC, 2025).

V. HORMONES INVOLVED IN CIRCADIAN RHYTHM AND JET LAG

Melatonin

Melatonin is a hormone produced mainly by the pineal gland. Its secretion is controlled by the circadian system and is normally higher during biological night, with light exposure suppressing its release. Melatonin acts as a timing signal that communicates darkness to the body and helps facilitate sleepiness; it is not simply an aesthetic or a universal sleep-inducing switch. When a traveller changes time zones, the melatonin rhythm may remain temporarily aligned with the home time zone. As a result, the person may feel sleepy at an inconvenient local time or struggle to sleep when the destination's nighttime begins.

Melatonin supplements may help some travellers when used at an appropriate time, but timing is important: taking it at the wrong biological time can shift the clock in an undesired direction. Product quality and dose may vary, and side effects or medication interactions are possible. Advice from a healthcare professional is appropriate, particularly for people who are pregnant, have chronic illness, take regular medication or need to remain fully alert. This document is educational and does not prescribe an individual dose.

Cortisol

Cortisol is a glucocorticoid hormone released by the adrenal cortex. It follows a daily rhythm influenced by the circadian system and sleep–wake timing. In many people, cortisol rises during the latter part of the night and is relatively high around the morning, helping support alertness and the transition to daytime activity. Circadian misalignment, travel stress and inadequate sleep can alter the normal pattern. Cortisol is also a stress-response hormone, so its levels are influenced by factors beyond the body clock, including illness, psychological stress and medication.

Other physiological signals

Growth hormone is secreted in pulses, with a substantial pulse commonly occurring during early-night slow-wave sleep; its secretion is related to sleep stage as well as biological timing. Core body temperature also follows a circadian rhythm and generally reaches a low point during the biological night. Appetite-related signals and digestive activity are influenced by circadian timing and meal schedules. These are not all hormones, but they are relevant physiological signals that may become misaligned when sleep, meals and local time change abruptly. Jet lag should therefore be understood as a whole-body timing disturbance rather than a problem involving melatonin alone.

Causes and Risk Factors

The main cause is rapid travel across two or more time zones, especially when the new local schedule differs substantially from the traveller's internal clock. The likelihood and severity of symptoms can be influenced by:

- Number of time zones crossed: more time zones generally require a larger adjustment.
- Direction of travel: eastward travel often requires advancing the internal clock and can be harder to adapt to than westward travel, which often requires a phase delay.
- Sleep deprivation before, during or after the flight.
- Flight timing, layovers, overnight travel and poor sleep opportunities.
- Individual differences in chronotype, age, health status and sensitivity to sleep loss.

- Exposure to light at an unhelpful time, irregular meals, alcohol or excess caffeine.
- Frequent travel or repeated changes in sleep schedules, which may prevent full adaptation.

Signs and Symptoms

Symptoms vary from person to person and may begin within a day or two of travel. Common manifestations include:

- Insomnia or difficulty falling asleep at the local bedtime.
- Early awakening or waking repeatedly during the night.
- Excessive daytime sleepiness, fatigue and reduced energy.
- Difficulty concentrating, slower reaction time and reduced performance.
- Irritability, low mood or reduced emotional regulation.
- Headache, general malaise or a feeling of being unwell.
- Gastrointestinal changes such as reduced appetite, constipation, nausea or altered bowel habits.

Jet lag may impair work, learning, decision-making and safe performance of tasks requiring sustained attention. Symptoms generally improve as the circadian system adapts to the destination's time zone. Severe, persistent or unusual symptoms should not automatically be attributed to jet lag; another sleep or medical condition may require assessment.

Pathophysiology

During rapid trans meridian travel, the external clock changes immediately but internal rhythms adjust gradually. The SCN, melatonin secretion, body temperature and other circadian outputs may remain on the departure schedule for several days. Meanwhile, the traveller is expected to eat, sleep, work and socialize according to destination time. This creates internal–external desynchronization. For example, when the destination is at night but the internal clock signals daytime, sleep initiation may be difficult. When the destination is in daytime but the internal clock signals night, sleepiness and impaired alertness may occur. Sleep loss can add to these effects by increasing homeostatic sleep pressure. As light exposure and daily routines provide time cues, circadian rhythms progressively shift toward the new time zone.

How common is jet lag?

Jet lag is a common issue many people experience when traveling. But people can experience jet lag in different ways and to varying degrees. Some people (especially children) may not notice any problems adapting to a new time zone.

Assessment and Diagnosis

Assessment begins with a travel and sleep history. The nurse or clinician should establish the departure and destination time zones, direction of travel, number of time zones crossed, date and time of arrival, usual sleep schedule, symptom onset, sleep duration and functional impairment. Ask about caffeine, alcohol, medication, pre-existing sleep disorders, mental health concerns and relevant medical conditions. A brief sleep diary can help document sleep and wake times over several days.

Jet lag disorder is considered when insomnia or excessive daytime sleepiness with reduced total sleep time follows travel across at least two time zones, accompanied by daytime impairment, malaise or somatic symptoms, and the presentation is not better explained by another disorder or substance. Routine laboratory testing is not usually required for uncomplicated jet lag. Further assessment is appropriate when symptoms are prolonged, severe, atypical or suggest another diagnosis (CDC, 2025).

Prevention and Management

Before travel

- When practical, shift bedtime and waking time gradually toward the destination schedule over several days.
- Arrive adequately rested; avoid deliberately restricting sleep before departure.
- Consider flight timing and the first day's demands when planning the trip.

During travel

- Drink water regularly and avoid excessive alcohol.
- Use caffeine cautiously and avoid it near the intended sleep period.

- Try to obtain sleep when it is appropriate for the destination schedule, while prioritizing adequate total sleep.
- Set watches and devices to destination time to begin mentally following the new schedule.

After arrival

- Adopt the local sleep–wake and meal schedule when feasible.
- Use appropriately timed outdoor light to help reset the circadian clock. Timing depends on travel direction and time zones crossed; generic advice to seek bright light at any time may be counterproductive.
- Keep naps short and avoid late-day naps if they interfere with nighttime sleep.
- Maintain a dark, quiet and comfortable sleep environment.
- Plan lighter duties during the period of greatest fatigue when possible.

Melatonin may be considered for some travellers, but correct timing is essential and product quality varies. A clinician or pharmacist can help assess suitability, interactions and timing. Sedative-hypnotic medicines are not routine self-care for every traveller and may cause impaired alertness, falls or other adverse effects. Medication should only be used after individual assessment and according to professional advice. Travellers should not drive or perform safety-critical tasks when significantly sleepy.

Nursing Management

Nursing care focuses on assessment, education, symptom reduction and safety. Relevant interventions include:

Assess the patient's normal sleep pattern, travel itinerary, symptoms, fatigue level and effect on daily functioning.

Explain circadian rhythm misalignment in simple language and reassure the patient that uncomplicated jet lag is usually temporary.

Help the patient plan regular sleep and wake times based on destination time, taking the direction of travel into account.

Promote sleep hygiene: a quiet and dark room, a comfortable temperature, reduced screen/light exposure before bedtime and a relaxing pre-sleep routine.

Encourage hydration, regular meals and light physical activity at appropriate local times.

Teach safe use of caffeine and explain that alcohol may fragment sleep even if it initially causes drowsiness.

Discuss timed light exposure and refer to reliable clinical guidance when a tailored phase-shifting plan is needed.

Refer for medical assessment if symptoms are severe, persistent, recurrent, or inconsistent with ordinary jet lag.

Advise against driving, operating machinery or making safety-critical decisions when alertness is impaired.

Evaluation should consider whether the patient is sleeping closer to the intended local schedule, experiencing less daytime sleepiness, concentrating better and returning to usual activities safely.

Complications and Safety Considerations

Most episodes are short-lived, but sleep loss and circadian misalignment can reduce attention, reaction time, mood stability and work performance. These effects are particularly important for healthcare workers, drivers, pilots and others with safety-sensitive responsibilities. Repeated travel without sufficient recovery can lead to ongoing sleep debt. Persistent insomnia, severe mood symptoms, breathing problems during sleep or excessive daytime sleepiness may indicate a condition other than uncomplicated jet lag and warrant assessment.

Difference Between Jet Lag and Ordinary Travel Fatigue

Feature	Jet lag	Ordinary travel fatigue
Main mechanism	Circadian misalignment after crossing time zones	Physical or mental exertion, disrupted routine or poor sleep
Time-zone crossing	Typically present	Not required
Sleep timing	Sleepiness and sleep may occur at the wrong local time	Usually related to tiredness and opportunity to rest
Management	Timed light, schedule adjustment and sleep strategies	Rest, hydration and recovery sleep

Key Points for Examination

- Jet lag is a temporary circadian rhythm sleep–wake disorder caused by rapid travel across time zones.
- The suprachiasmatic nucleus (SCN) of the hypothalamus is the master circadian pacemaker.
- Jet lag is caused by a misalignment between the internal circadian clock and the external environment, and it has been classified within the category of a circadian rhythm sleep disorder, reflecting its basis in disrupted biological timing rather than general travel fatigue.
- Light detected by the retina is the most important synchronizing cue.
- Melatonin generally rises during biological darkness and is suppressed by light.
- Cortisol commonly rises toward morning; its rhythm is influenced by circadian timing, sleep and stress.
- Eastward travel often requires a phase advance; westward travel often requires a phase delay.
- Symptoms include insomnia, daytime sleepiness, fatigue, impaired concentration and gastrointestinal disturbance.
- Timed light and, in selected cases, appropriately timed melatonin can support adaptation.
- Nursing priorities include sleep assessment, education, sleep hygiene and safety.

VI. CONCLUSION

Jet lag results from a temporary mismatch between the body's internal circadian timing and the local time after rapid travel across time zones. The SCN, light–dark exposure, melatonin, cortisol, sleep pressure and daily routines all contribute to the regulation of sleep and wakefulness. Understanding these mechanisms enables nurses to explain symptoms, assess functional impact, provide practical education and promote safe recovery. Management should be individualized, especially when advising on the timing of light exposure or melatonin.

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