Jet Lag

Prof. Larry Goodyer

Lee Baker
Circadian Rhythm

• 24 hour biological clock determined by the light-dark cycle of night and day and other ‘zeitgebers’
• Regulates body functions based on sleep/wake cycle
  – Appetite
  – Digestion
  – Bowel habits
  – Urine production
  – Body temperature
  – Blood pressure
• Disrupted by changes in sleep pattern
Role of melatonin

• In the pineal gland:
  – tryptophan $\rightarrow$ serotonin $\rightarrow$ melatonin
    (released in response to darkness)

• In the suprachiasmatic nucleus of the hypothalamus:
  – melatonin works on MT1 and MT2 receptors
Underlying factors of jetlag

- Dysregulation of circadian rhythm
- Low melatonin production and secretion
- Occurs when one crosses 3 or more time zones
- Symptoms are worse:
  - with advanced age
  - travelling Eastwards compared to Westwards
  - With the number of time zones crossed
Jetlag symptoms

- Disruption of the sleep/wake cycle (body clock)
- Daytime fatigue
- Reduced alertness
- Loss of appetite
- Reduced cognitive skills
- Affective disorders may be exacerbated, resulting in psychiatric morbidity
- Gastrointestinal symptoms
Phase shifting - adjusting to local time

• Adopt local sleep time ASAP
  – Adapt before you go?
  – Measure to keep you awake to local bedtime
  – Measures to put you to sleep at local bedtime

• Expose to sunlight at appropriate times?
  – Bright light in the morning (5am-11 am) advances body clock (wake earlier)
  – Bright light in the evening (10pm- 4 am) delays body clock (wake later)

• Use Melatonin
  – Take in the morning phase delay
  – Take at night phase advance
  – Use also as an hypnotic 3-5mg for 4 nights on arrival
Preventative strategies

• Lifestyle and environmental strategies
• Sedative/hypnotics
• Melatonin and its agonists
• Stimulants
• Homeopathic products – ‘No Jet Lag’
• Transcranial bright light
Z-drugs (zopiclone, zolpidem)

• Improves quality of sleep but no other jet leg components.
• Number of adverse effects, including headache, dizziness, Nausea, confusion and amnesia.
• Benefit is outweighed by common unpleasant adverse effects.
Melatonin

• Advantages:
  – No hangover effect
  – No withdrawal symptoms
  – No addictive potential
  – A No of studies favoured melatonin over placebo (low quality evidence)

• Disadvantages:
  – Very short half-life
  – Additional mechanisms play a role in sleep maintenance
  – Not regulated
  – Use with caution in those with epilepsy or on oral anticoagulants
  – Adverse effects not fully investigated
  – Can exacerbate rheumatoid arthritis
Melatonin agonists

• Ramelteon (Rozerem), tasimelteon – stronger affinity for MT₁ and MT₂ and longer half-life
• Agomelatine (antidepressant)
Stimulants –

Target daytime sleepiness

• Modafinil or Armodafinil (promotes dopamine)
  – Adverse effects include Stevens-Johnson syndrome, cardiac effects and abuse potential
• Caffeine (don’t give after midday, as this may affect nocturnal sleep)
Other sedatives

• Use short-acting benzodiazepines to minimise daytime sedation.

• Improve sleep quality and duration, but no convincing data of positive effect on daytime functioning,
How long does jetlag last?

• Depends on No of time zones crossed – body will adjust to new time zone at rate of 1-2 time zones per day. Cross 6 time zones eastward – body will take 4-5 days to adjust.
• Cross 6 time zones westward – body will adjust in 3 days
Coping with jetlag

No high quality evidence to show that these are effective.

- Eat right, get plenty of exercise and eat right
- Change your schedule - adjust your body to the new time zone gradually, before you leave
- If you have a medical condition such as diabetes, consult a doctor to work out how to cope
- Avoid alcohol
- Avoid caffeine
- Drink plenty of water
- Move around on the plane
- If crossing 8-12 time zones, try and break up journey, spending some time about halfway
- Wear comfortable clothes and shoes
- Adapt to the local schedule as soon as possible
- Minimise sleep medications
- Try phase shifting
- Spend time outdoors as natural light assists in adjusting to new schedule
Phase shifting – what should you do on arrival Eastward flight

• Passenger is travelling New York to London leaving NY at 10 am in the morning. Flight time is eight hours
  – Arrival London time is 11pm. Body clock set at 6pm
  – Phase advance required of five hours
  – Aid sleep on arrival
  – Take Melatonin for four nights
  – Expose to sunlight in the morning (If you can find it in London)
Eastward leaving at 6pm NY-London

• Many NY flights scheduled for early afternoon e.g. 6pm
  – Arrives London time 7 am. Body clock set at 2am
  – Phase advance out of sync with local sleeping pattern. Phase advance more difficult
  – Sleep inflight more important.
    • Take melatonin at destination bedtime.
    • Z drugs
  – Phase advance with power naps?
  – Reset rhythm with light exposure? www.jetlagrooster.com

Eastwards flights more of a problem often
Phase shifting – what should you do on arrival Westward flight

• Leave London at 10 am
• Arrive local time NY 1pm. Body clock set at 6pm
• Stay awake till local time

Westward flights often easier
References

- Herxheimer A. Jet lag. Clinical evidence 2014;04:2303