

Melatonin in Aircrew ?

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- ✓ Discuss the usefulness of melatonin for aircrew.
- ✓ Analysis of literature and own data of jet lag studies of aircrew

Aviation is a 24/7 industry:

- Multiple time zone transitions
- Night flying / Early starts
- Irregular work schedules



**Mixture of shifted time, shifted work, and work schedules:
compound and intractable circadian disruptions**

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Jet Lag

Daytime Sleepiness



Night time Wakefulness



Fatigue

Flight Safety Risk

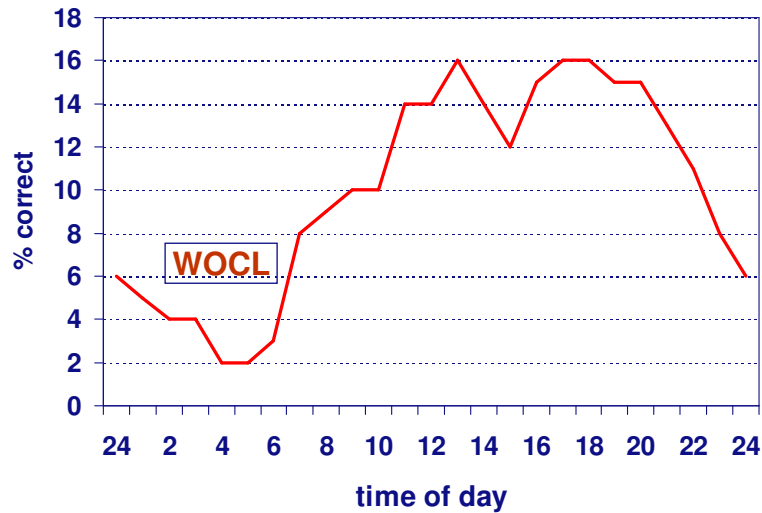
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Alertness / Cognitive Performance Rhythm



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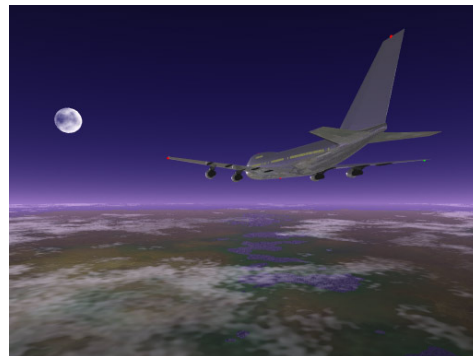
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Night Flights and Early Morning Flights

- Low level of Performance and Alertness (WOCL)
- Body clock dictates sleep
- Sleep debt
due to low quality sleep
during the day



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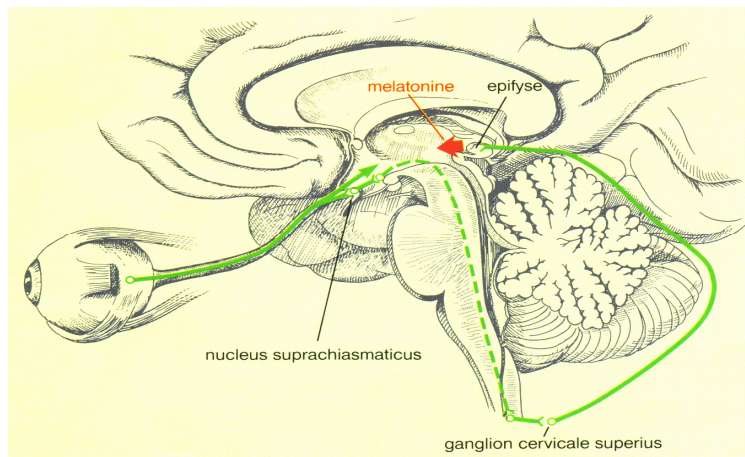
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**Sleep loss and fatigue may facilitate
errors and risk taking**

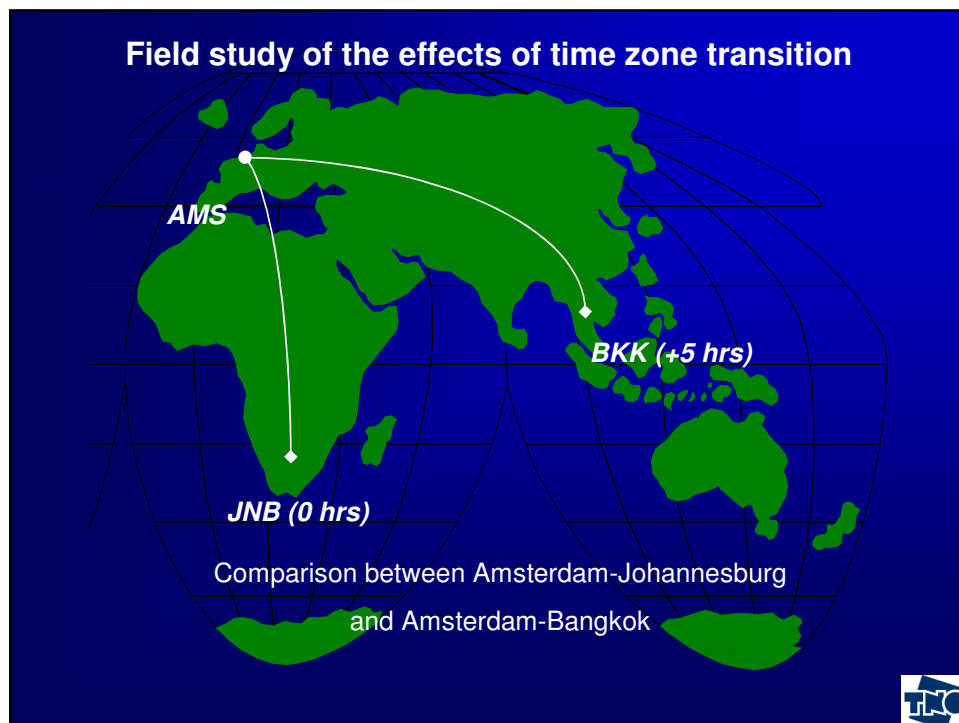
The Biological Clock hinders Flight Safety



So, why not use melatonin ?

Placebo controlled studies

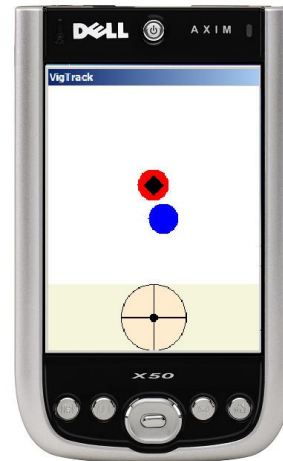
- Passengers: reduction jet lag complaints
(Arendt et al. 1986 / 1988; Suhner et al. 1998)
- Professionals: no effect
(Edwards et al. 2000)
- Aircrew: mixed results
(Petrie et al. 1989 / 1993)



TNO Sleep / Alertness Field Research Tools in Aviation



Actiwatch



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Study Characteristics

- between groups design
- 39 pilots (18 BKK, 21 JNB), captains and first officers

	Departure (day 1)	Arrival (day 2)	Shuttle Flight (day 4)	Departure (day 5)	Arrival (day 6)
BKK (+5)	19:40	11:40	Taipei (noon/evening)	23:20	05:45
JNB	20:10	06:50	Cape Town (morning / noon)	18:55	05:45

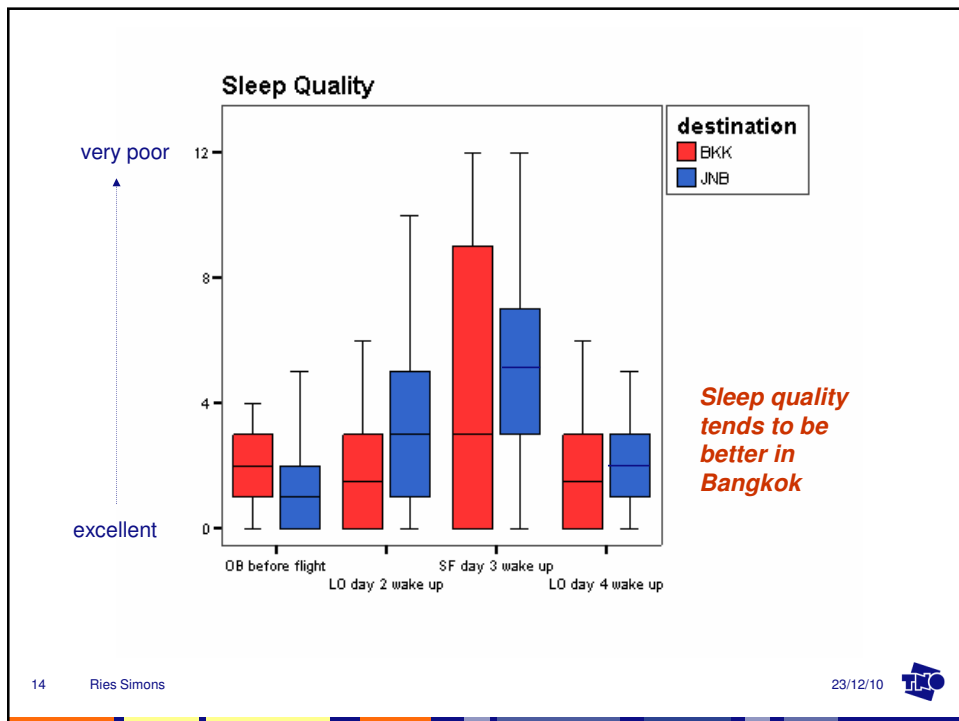
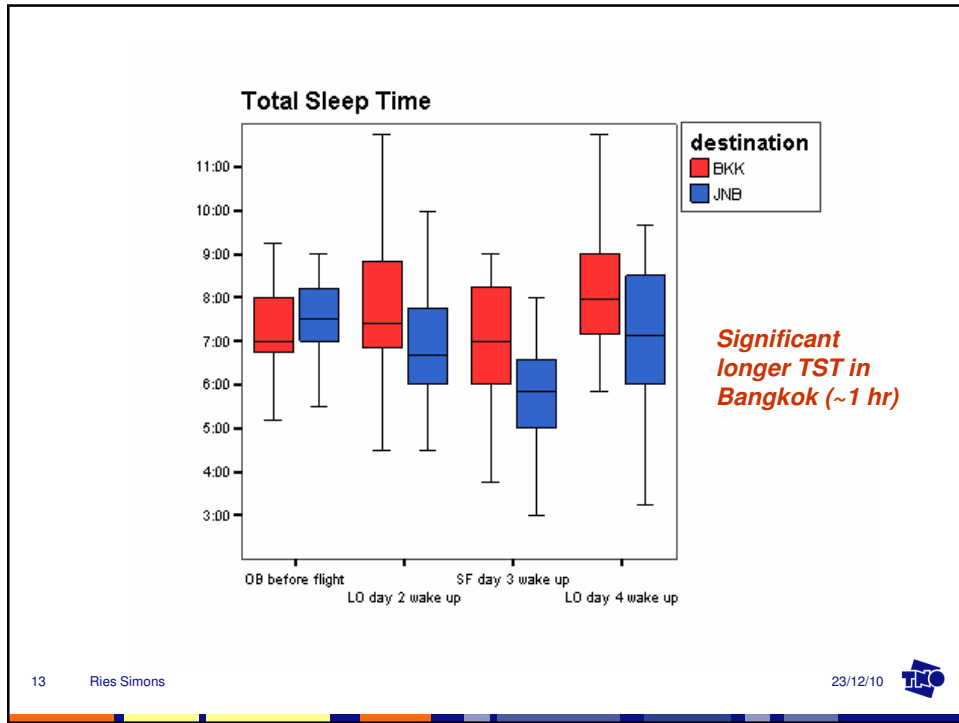
outbound: night flight

inbound: night flight

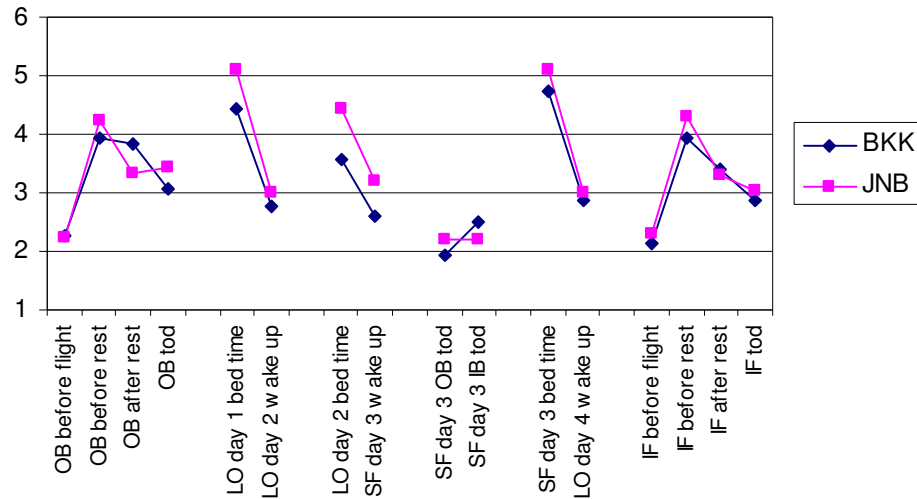
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Sleepiness: SSS

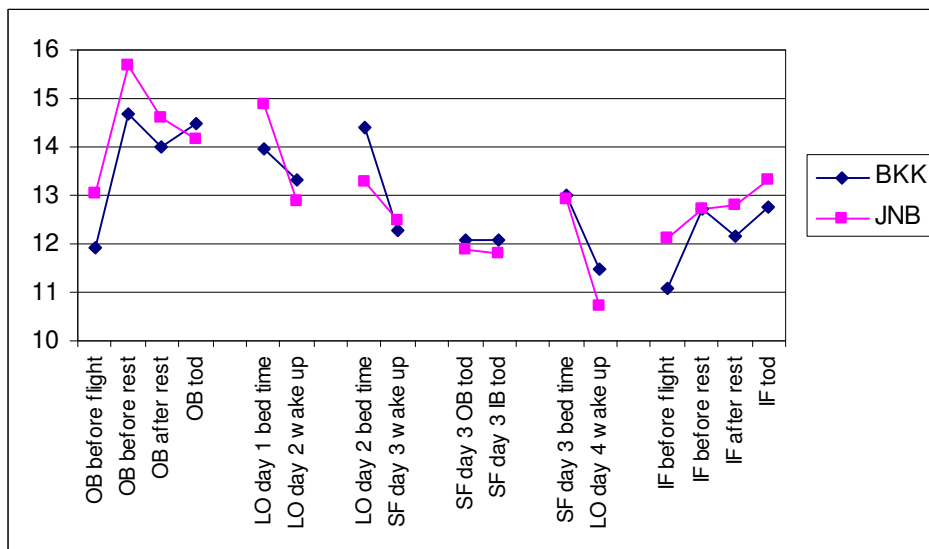


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Tracking Performance



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We found no differences in sleep characteristics or vigilance of aircrew on trips with 5 hrs (eastwards) and 0 hrs time difference



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No clear jet lag symptoms in intercontinental aircrew

- multiple time zone transitions within short period of time
- night flying / early starts
- irregular work schedules
- healthy worker effect
- motivation to be active at layovers
- “jet lag” symptoms considered as normal and inherent to the job
- results of studies may depend on which variable is assessed



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7. MELATONIN:

RECOMMENDATIONS CONCERNING ITS USE BY AIRCREW

7.3 Although no clinical trials have been carried out in the USA upon the use of melatonin, it is known that inappropriate timing of taking this compound can cause disturbed sleep and undesirable shifts in circadian rhythms. An informal survey has revealed that some users experienced nightmares, morning grogginess, mild depression, nausea and genital pain.

7.4 In the light of what is now known about melatonin, its use by flight and cabin crew is not recommended. Because melatonin will cause sleepiness and impair performance immediately after ingestion, and because the after-effects could be detrimental to operational efficiency, **the use of this compound less than 12 hours before the start of a flying duty period and on board an aircraft should be forbidden.**

Adverse Effects Melatonin: no systematic studiesAcute effects (Herxheimer & Petrie, Cochrane Review 2003)

- sleepiness, drowsiness
- headache / “heavy head”
- disorientation
- nausea / gastro-intestinal problems
- sporadic reports of other effects
- influence on patterns of other hormones

Chronic treatment

- 10 mg – 28 days: no differences between MEL and Placebo
(De Lourdes et al., J Pineal Res 2000; 29(4):193-200)
- 2 mg – 2 months: phase advance of cortisol and testosterone
(Terzolo et al., J Pineal Res 1990; 9(2): 113-124)

Would melatonin be useful for aircrew ?

- sleep-phase advance for early start?
- for easier adaptation at home?
- not during long-haul trips?

However,

- systematic research of adverse effects is needed
- discussion point: adapt pilots to the job,
or adapt the job to the pilot?



Melatonin for commercial aircrew?

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‘Effects of melatonin, taken during duty, will be minimal,
or counter-productive’