

# - Fit to Fish? -

## recognising excessive (daytime) sleepiness

Maritime and Coastguard Agency  
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# Primary/central hypersomnias

## – including narcolepsy

For other causes of excessive sleepiness, see Chapter 8 (miscellaneous conditions).

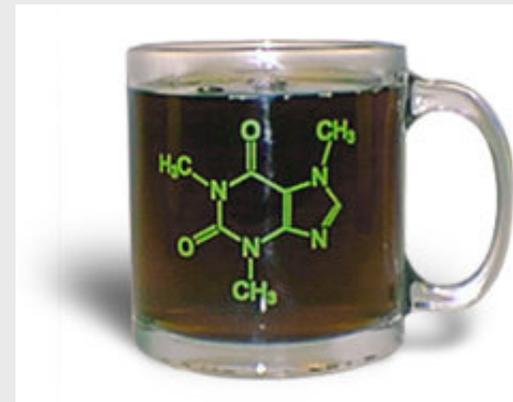
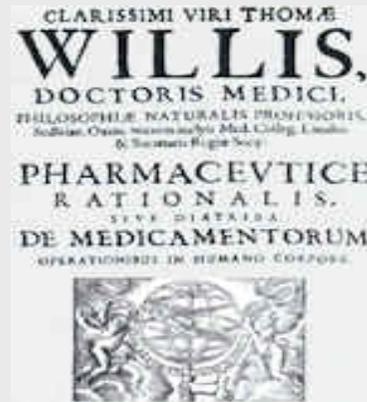
	<b>Group 1 car and motorcycle</b>	<b>Group 2 bus and lorry</b>
	<p>● Must not drive and must notify the DVLA.</p> <p>A licence may be reissued only when there has been <b>satisfactory</b> symptom control with appropriate treatment for at least 3 to 6 months.</p> <p>When an applicant or licence holder is not on appropriate treatment, relicensing may be considered after <b>satisfactory objective assessment</b> of maintained wakefulness, such as the Osler test.</p>	<p>● Must not drive and must notify the DVLA.</p> <p>Relicensing may be considered following a 6 month period of stability, subject to satisfactory objective assessment, performed by a specialist, of maintained wakefulness, such as the Osler test.</p> <p>Must also satisfy standards as for Group 1 licensing.</p>

- ❖ I. **Defining excessive sleepiness**
  - a new medical concept?
  - what is “good” sleep?
  - measuring sleepiness
  
- ❖ II. **Beyond the Epworth**
  - associated features of EDS
  
- ❖ III. **Epidemiology and causes**

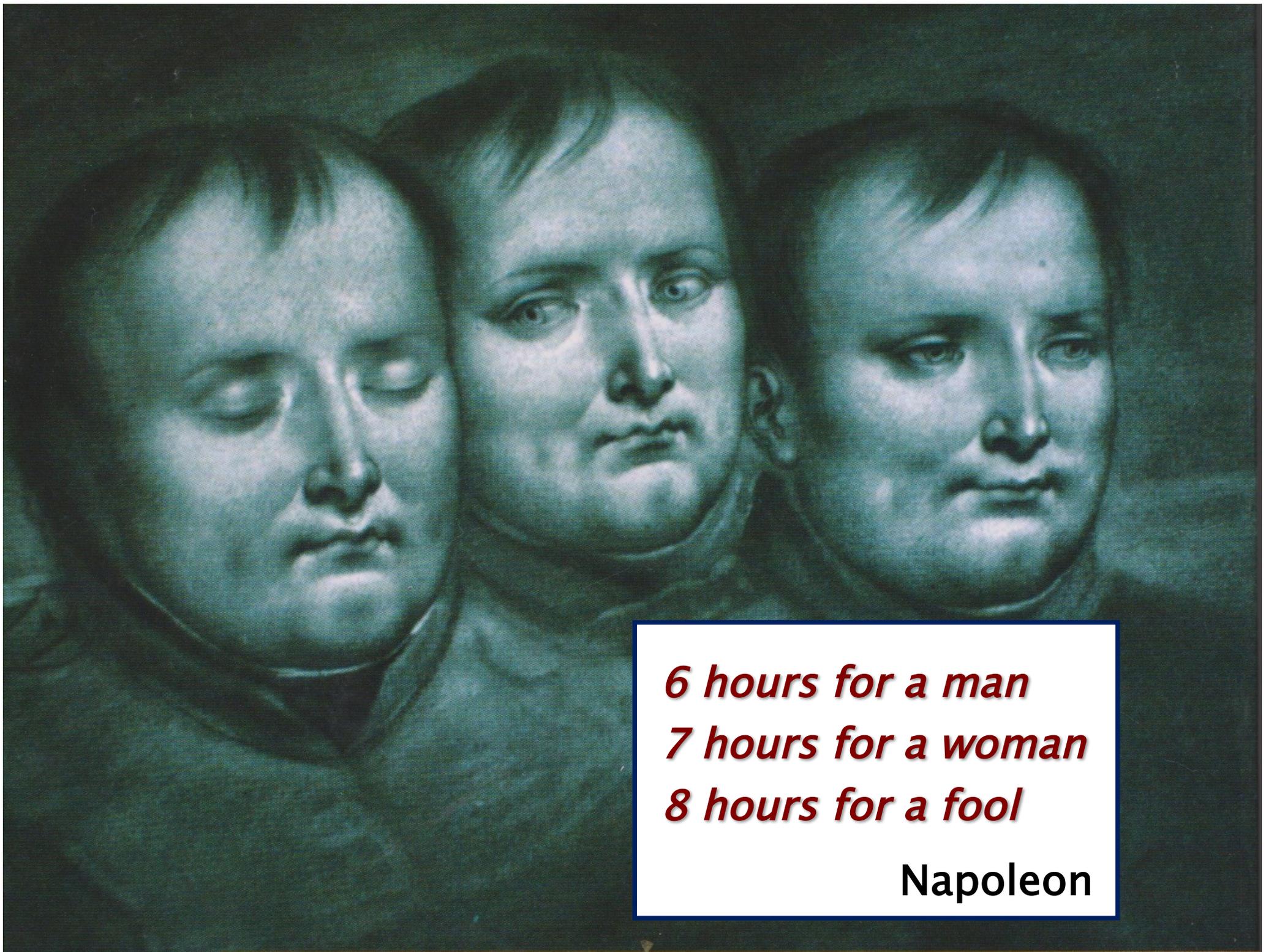
# Excessive daytime sleepiness (EDS) a new medical concept?

- ❖ historical descriptions of EDS symptoms are relatively rare

*A sleepy disposition – they eat and drink well,  
go abroad, take care well of their domestick affairs,  
yet whilst talking or walking, or eating, yea their  
mouthes being full of meat, they shall nod, and unless  
roused by others, fall fast asleep* Willis c.1655

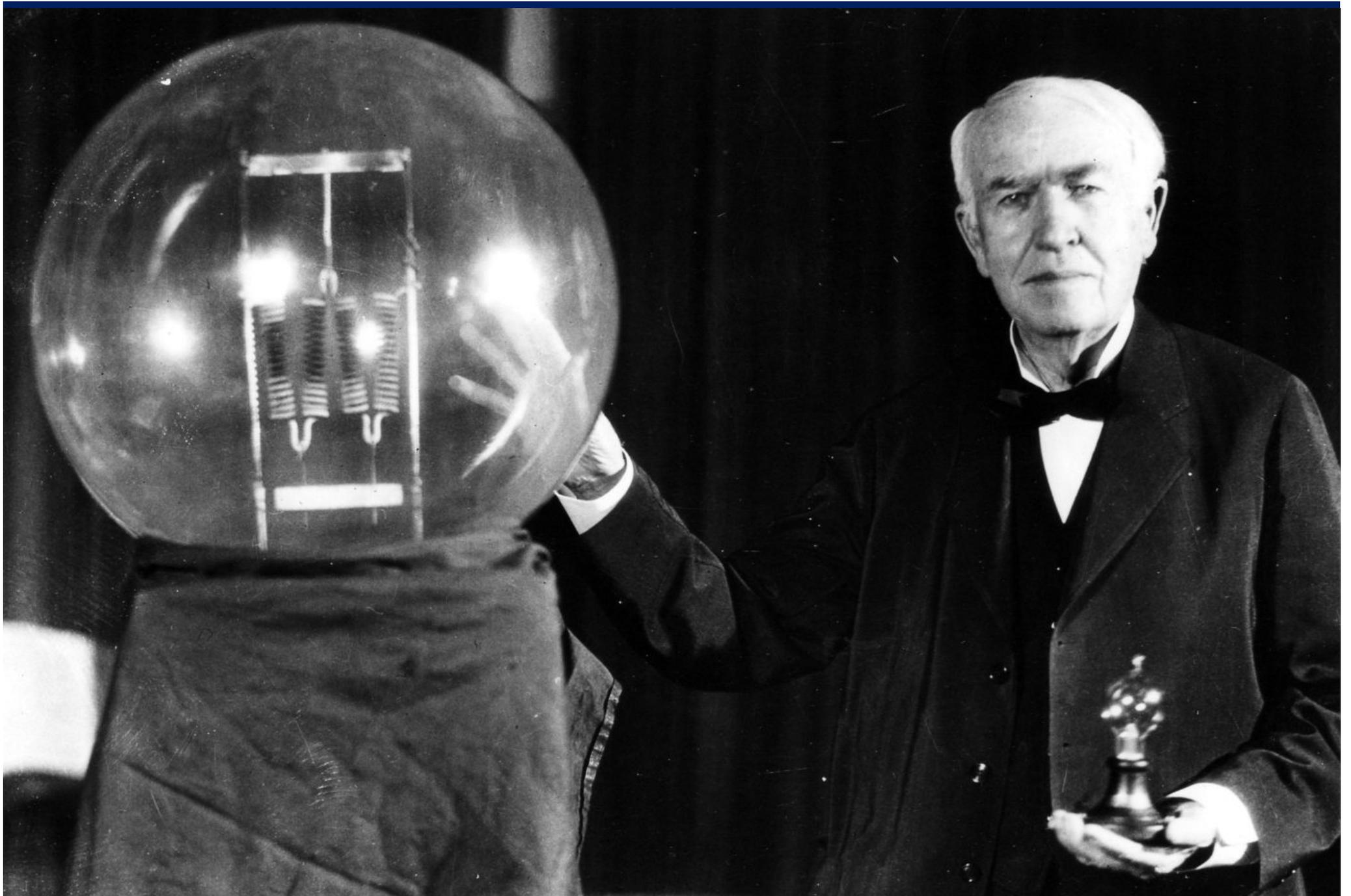


- ❖ **note : EDS (usually) distinct from complaint of “fatigue”**  
other terms may also confuse (somnolent, drowsy, tired, weak ...)  
can also be difficult to exclude motivational factors in mood disorders



*6 hours for a man  
7 hours for a woman  
8 hours for a fool*

**Napoleon**



**“Sleep is a criminal waste of time, inherited from our cave days”**

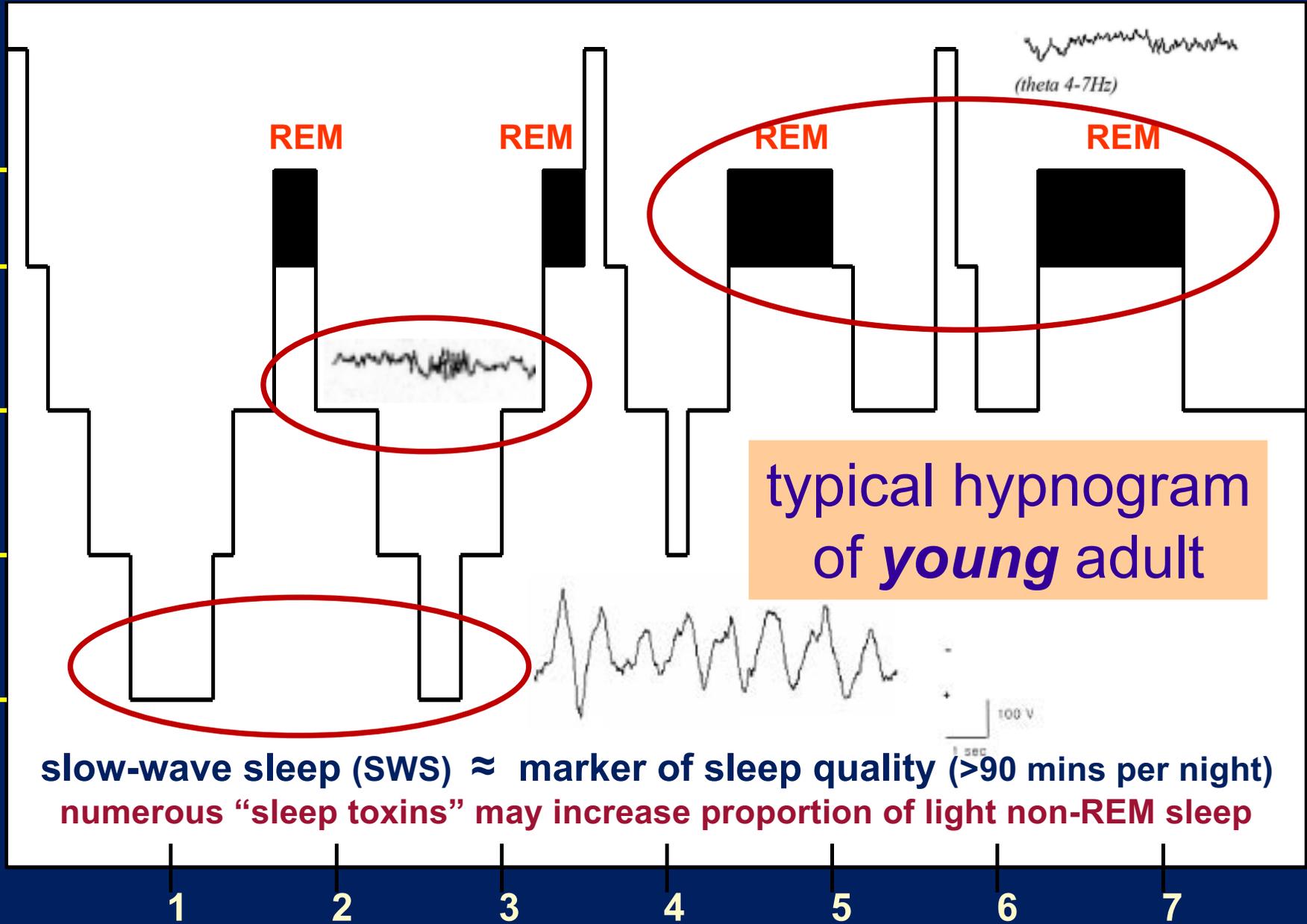
WAKING

REM  
Sleep

NREM Sleep Stage

N3

IV



typical hypnogram  
of *young* adult

slow-wave sleep (SWS)  $\approx$  marker of sleep quality (>90 mins per night)  
numerous "sleep toxins" may increase proportion of light non-REM sleep

time (hours through night)



# Measuring EDS

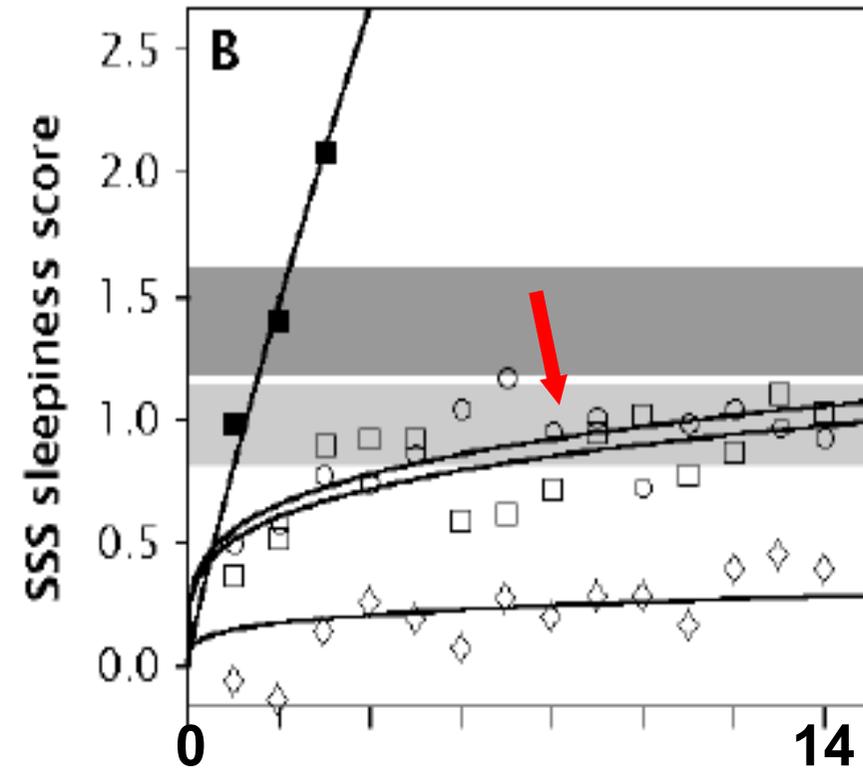
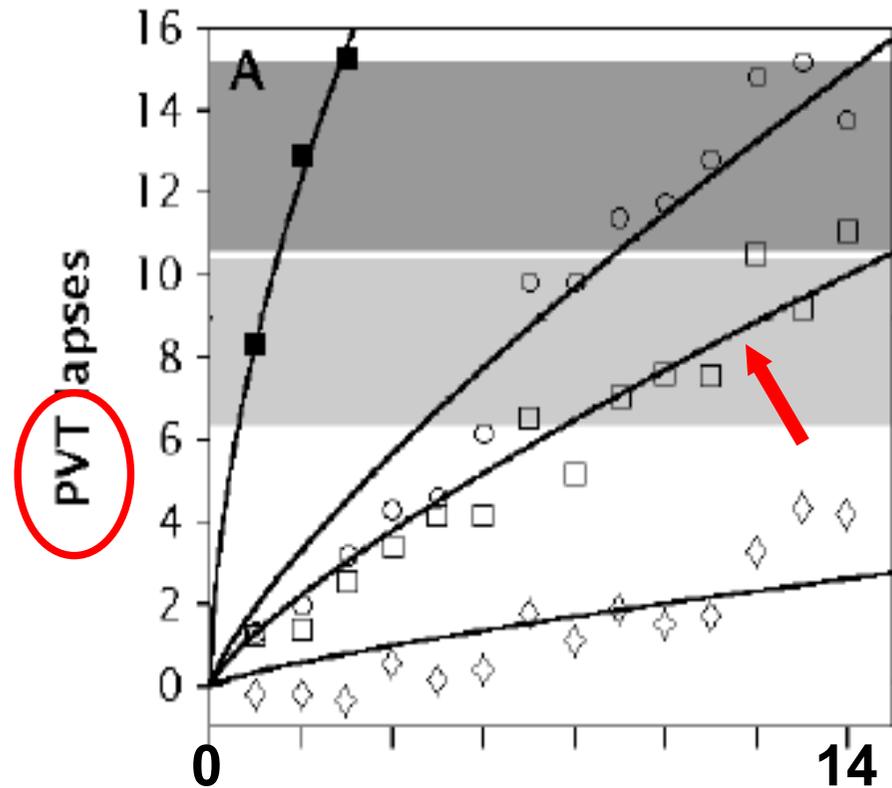
## subjective

*The Epworth scale - the likelihood of dozing in the following situations:*

- ❖ Sitting and reading
- ❖ Watching TV
- ❖ Sitting inactive in a public place (eg theatre or meeting)
- ❖ Sitting as a passenger in a car for an hour without a break
- ❖ Lying down to rest in the afternoon when circumstances permit
- ❖ Sitting and talking to someone
- ❖ Sitting quietly after lunch without alcohol
- ❖ Sitting in a car while stopped for a few minutes in traffic

**Patient rates each item as 0 (would never doze) to 3 (high chance of dozing)**  
**ESS total score: 0 → 24 (>10 abnormal?)**

# subjective $\neq$ objective sleepiness



- ◇ 8 hrs/night
- 6 hrs/night
- 4 hrs/night
- 0 hrs/night

PVT = psychomotor vigilance test

data suggest increasing signs of sleepiness despite regular 6 hours of nocturnal sleep but subjective sleepiness  $\neq$  objective sleepiness

# Measuring EDS

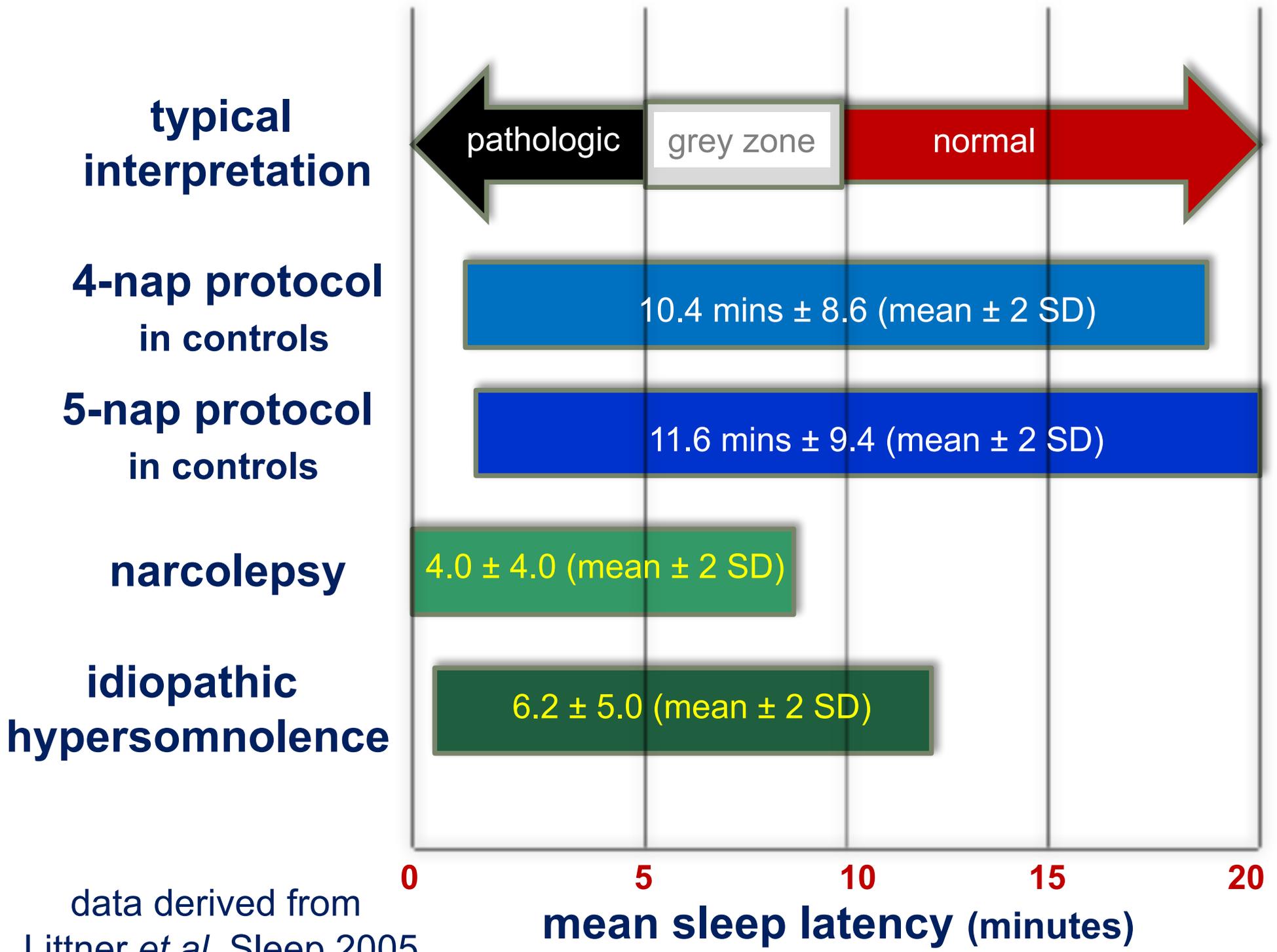
## objective

### ❖ the Multiple Sleep Latency Test (MSLT)

mean sleep latency and type of sleep onset in 4 or 5 naps

- previous night's sleep should be monitored
- rigorous and strict routine essential for correct interpretation
- age effects usually ignored
- what is normal range?





data derived from  
Littner *et al* Sleep 2005

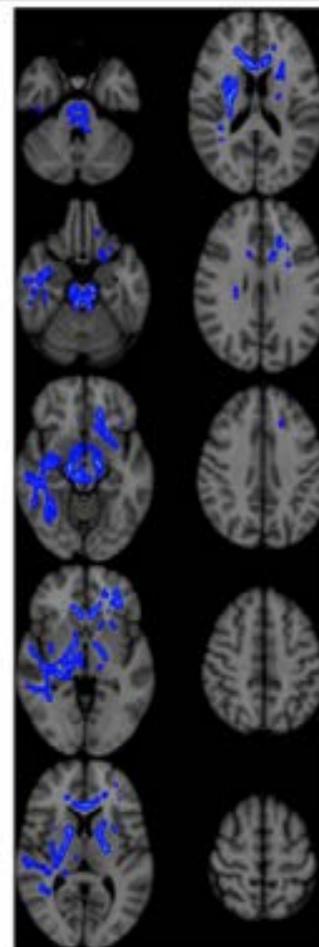
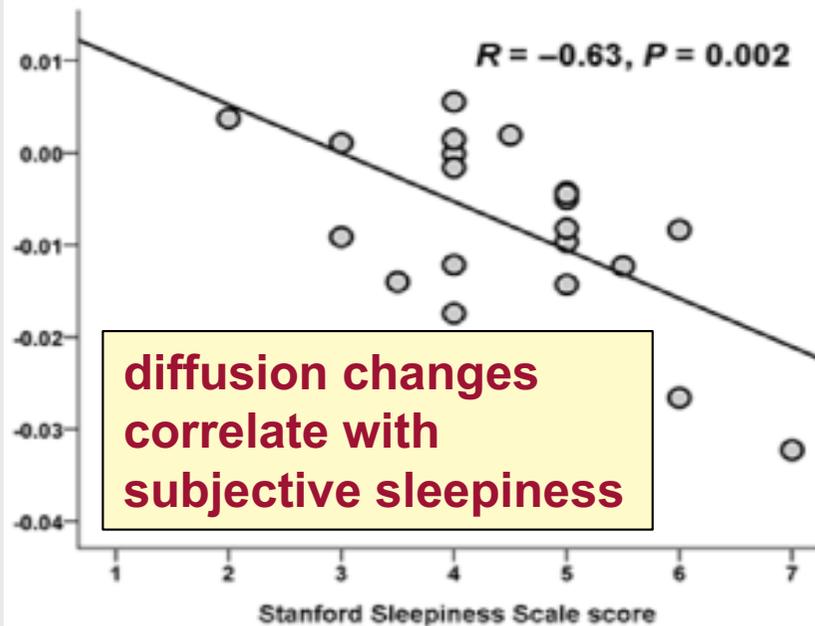
# Structural brain imaging after acute sleep deprivation

- ❖ recent evidence for significant white matter tract changes
- diffusion tensor imaging (DTI) shows H<sub>2</sub>O diffusion across membranes
- after 23h awake: significant ↓ in axial & mean diffusivity in many areas including fronto-temporal cortex, brainstem, thalamus

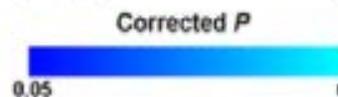
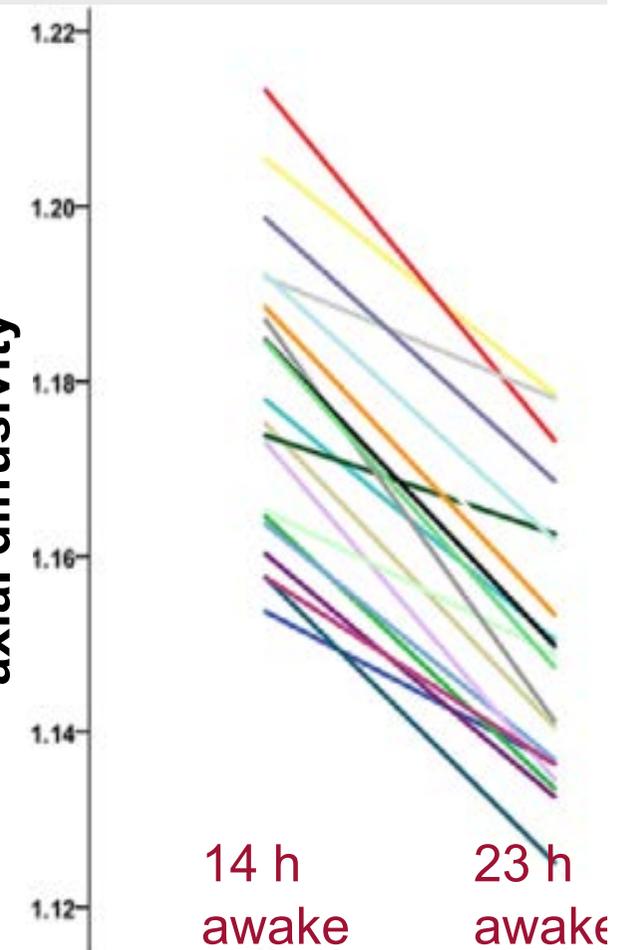
PLOS ONE | DOI:10.1371/journal.pone.0127351 May 28, 2015

## Widespread Changes in White Matter Microstructure after a Day of Waking and Sleep Deprivation

Torbjørn Elvsåshagen<sup>1,2,4,6\*</sup>, Linn B. Norbom<sup>7</sup>, Per Ø. Pedersen<sup>1</sup>, Sophia H. Quraishi<sup>9</sup>, Atle Bjørnerud<sup>3,8</sup>, Ulrik F. Malt<sup>1,5,6</sup>, Inge R. Groote<sup>3,7</sup>, Lars T. Westlye<sup>4,7</sup>



axial diffusivity



# **Clinical features associated with EDS**

## **often more disabling in real life situations ...**

### ❖ **clinical observations associated with EDS**

yawning, “bags” under eyes, less attractive to opposite sex (!)  
eye-blinks slower (more frequent)  
pupillary diameter “unstable”  
clumsy, motor skills impaired  
sudden adjustments when driving



### ❖ **impaired brain function**

reaction times slower, “brain fog”  
brain “ages” by ~10 yrs for every 90 mins of sleep deprivation  
vigilance / sustained attention particularly affected  
brain has to work “harder” to complete cognitive tasks  
lapses and “micro-sleeps” a common practical concern  
note the eyes can be open in >30% episodes

dealing with unexpected events;  
increased mistakes when shifting  
rapidly between simple cognitive tasks  
(Couyoumdjian 2009)

increased distraction  
seen on mundane (driving) and  
complex tasks (baggage screening)  
(Anderson 2013, Basner 2008)

poor recognition of emotions;  
less trustful  
(van der Helm 2010;  
Anderson 2010)

morning types especially  
affected by adverse (acute)  
effects of night shift  
(Groeger 2008)

***poor decision making  
on/after night shift***  
(Horne 2012)

sudden waking during sleep  
at night impairs military  
strategic decisions  
(Horne 2011)

less risk averse  
and reduced learning  
about losses when gambling;  
more impulsive  
(Venkatraman 2007  
Anderson 2011)

“values” associated  
with economic decision making  
and visual reward altered  
(Libedinsky 2011)

**medical staff  
politicians / diplomats  
bank traders**

stimulant drugs (cocaine...?) reduce  
sleepiness and improve alertness but do  
not improve impaired risk assessment  
(Killgore 2011)

sleep deprivation biases  
towards pursuit of gain (greedy)  
rather than avoidance of loss  
(Venkatraman 2011)

# Epidemiology and causes of EDS

- ❖ **meta-analysis included 26 population studies (Ohayon 2011)**
  - note : 14 (!) definitions of EDS used in >60 000 subjects
  - overall mean prevalence of EDS is ~8%

in: *“Sleepiness: causes, consequences and treatment”* eds. Thorpy M and Billiard M



# EDS affects ~8% of population?

**Primary Sleep Disorders**  
“central” disorders of sleep-wake regulation  
(~2% of sleepy population?)

- **Narcolepsy** (primary / “secondary”)
- **Idiopathic hypersomnolence**
- **Klein-Levine syndrome**

**Sleepiness Secondary to a Chronic Disorder**

- **Obstructive Sleep apnoea/hypopnoea syndrome**
- **Restless legs syndrome**
- **Parkinson’s disease**
- **Myotonic dystrophy**
- **Multiple sclerosis**
- **Depression?**

**Circadian Misalignment**

- **Shift work sleep disorder**
- **Delayed and advanced sleep phase syndromes**  
(strong genetic influences)

**In real life:** (voluntary) sleep restriction  
the environment (e.g. noise)  
pain  
other medical conditions



**factors potentially affecting sleep-wake cycle**  
**“secondary” (co-morbid) insomnia**

***Medical causes***

- **Obstructive sleep apnoea**
- **Nocturnal asthma**
- **Oesophageal reflux**
- **Prostatism / nocturia**
- **Pain syndromes**

diabetic neuropathy,  
fibromyalgia

***Neurological causes***

- **Restless legs syndrome**
- **Parkinson’s disease**
- **Multiple sclerosis**
- **Dementia**
- **Morvan’s syndrome**
- **Fatal familial insomnia**

***Psychiatric causes***

- **Medication related**  
(stimulating anti depressants)
- **Withdrawal-related**
- **Anxiety disorders**
- **Mood disorders**

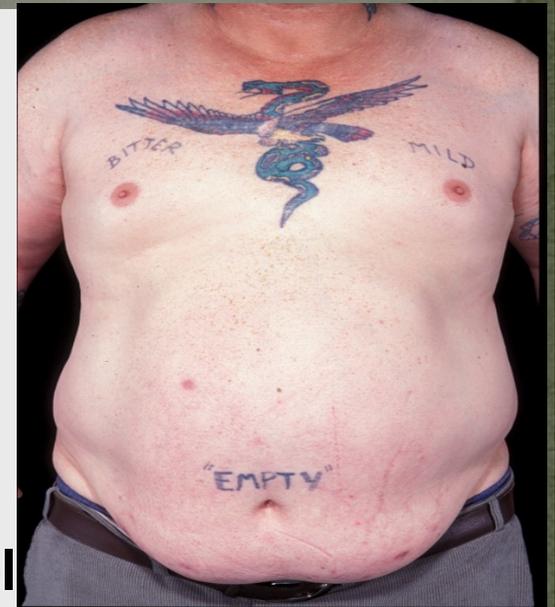
**“sleep toxins” adversely affecting sleep quality**

inhibit progression from  
light non-REM sleep to  
deep slow wave sleep

**don’t forget the environment :**  
light, temperature extremes,  
discomfort, noise, snoring partner!

# Obstructive Sleep Apnoea (syndrome)

- ❖ usually easy to pick up from history / phenotype
  - male, overweight, neck circumference > 17"
  - don't overlook retrognathia, large tonsils
  - ~4% middle-aged men (2% women)
  - unrefreshing sleep with severe snoring/pauses
  - nocturia, dry mouth in morning, worse > alcohol



- ❖ confirmed by investigations (oximetry or ambulatory home study)

apnoea/hypopnoea index (AHI) : <15 ~mild; 16-30 ~moderate; >31 ~severe  
or oxygen desaturation index (ODI)

- ❖ treatment options: wt loss  
CPAP  
MAD's  
surgery



# Restless legs syndrome and periodic limb movements of sleep

associates with : neuropathy ; anaemia (Fe↓) ; renal failure

## ❖ U.R.G.E.

- URGE to move legs
- worse with REST
- better if you GET up
- worse in EVENING

# Drugs and sleep quality

- ❖ commonly used drugs to treat symptoms associated with poor sleep (e.g. neuropathic pain, anxiety, depression) may facilitate sleep onset and increase its duration but not improve its overall quality :

▪ Opiates	:	REM ↓↓	SWS ↓↓	arousals ↑↑↑
▪ AED's	:	REM ↓	SWS ↑	sleep quality poor
▪ Anti-dep	:	REM ↓(↓)	SWS ↓↔	sleep maintenance ↓↔ restless legs worse
▪ BZ's / alc	:	REM ↓	SWS ↓	sleep maintenance ↑
▪ β-blockers	:	REM ↓	SWS ↔	bad dreams/nightmares; impaired sleep onset (note: melatonin inhibited)

# Drugs that may enhance deep sleep *and improve “quality”*

❖ Pregabalin

❖ Gabapentin

❖ Tiagabine (**Gabatri**)

❖ Sodium oxybate (**Xyrem, GHB**)

❖ Melatonin (**Circadin**) \*

❖ Cannabis

❖ Agomelatine

❖ Trazodone?

❖ Vortioxetine?

\* only drug with specific  
indication for insomnia



# Conclusions

- ❖ **EDS has a number of causes and is important!**
  - no simple measure to assess EDS (it's all in the history!)
  - subjective ≠ objective (especially in elderly or if problem chronic)
- ❖ **EDS may manifest in different ways**
  - “brain fog”, concerns over dementia, micro-sleeps / lapses
  - EDS is not part of normal ageing
- ❖ **OSA, RLS and drug effects are often overlooked**
  - severe OSA can affect thin people
  - sedative drugs / strong pain killers are generally “sleep toxic”
- ❖ **Treatments can be life-changing**
  - if cause not (easily) reversible, wake-promoting drugs appropriate?

