

- 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).

	Group 1 car and motorcycle	Group 2 bus and lorry
	<p>● Must not drive and must notify the DVLA.</p> <p>A licence may be reissued only when there has been satisfactory 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 satisfactory objective assessment 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

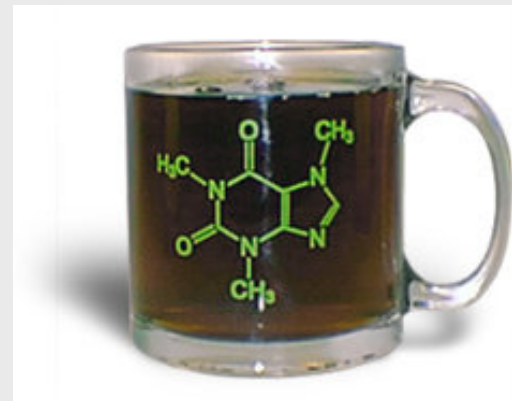
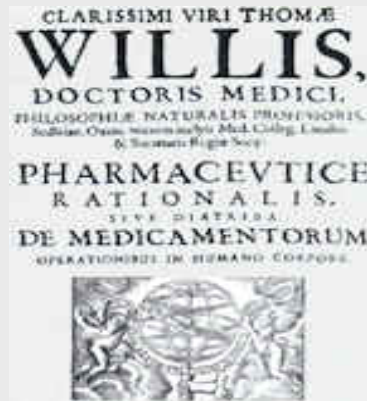
- ❖ II. **Beyond the Epworth**
 - associated features of EDS

- ❖ III. **Epidemiology and causes**

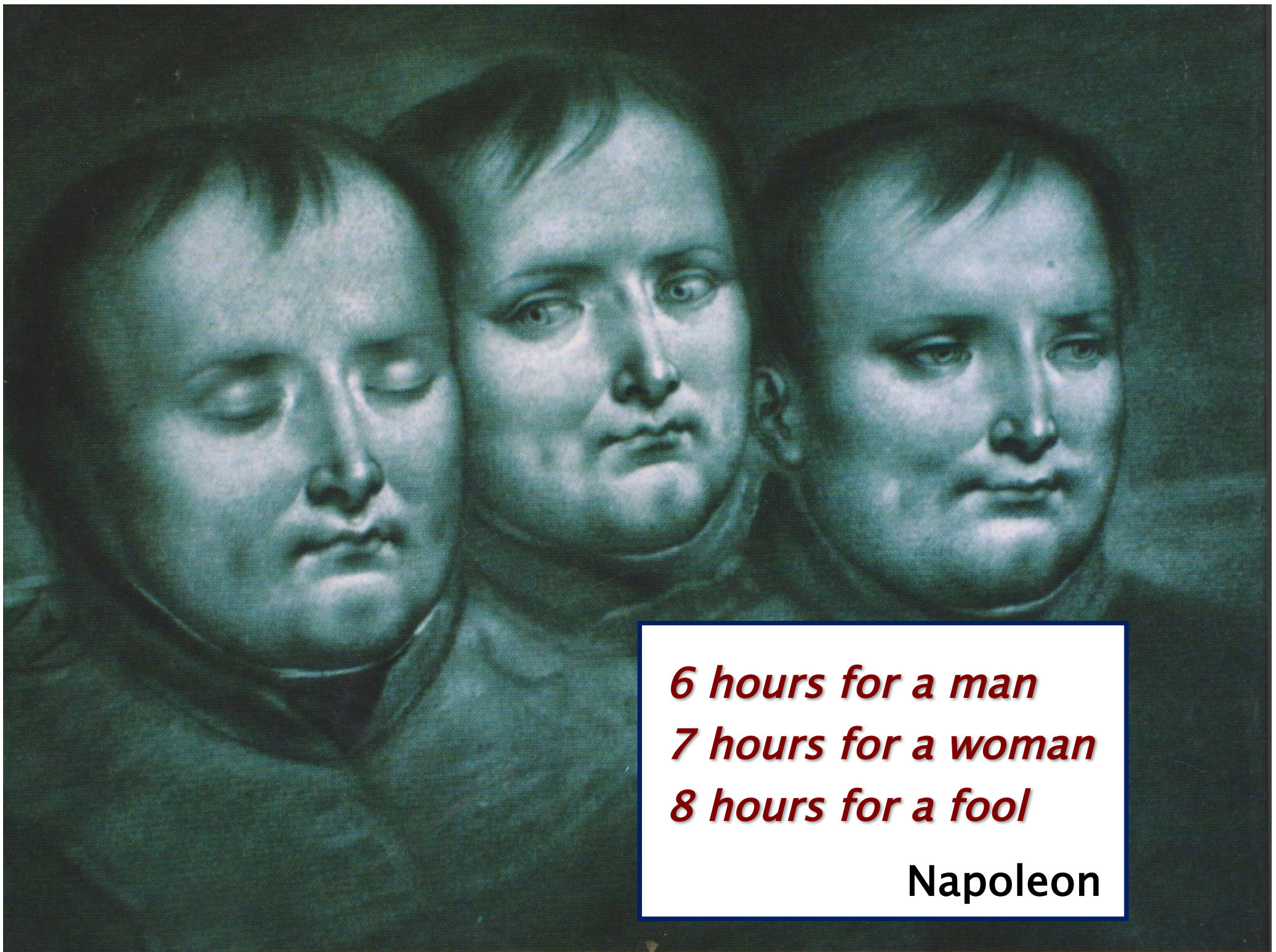
Excessive daytime sleepiness (EDS) a new medical concept?

- ❖ 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

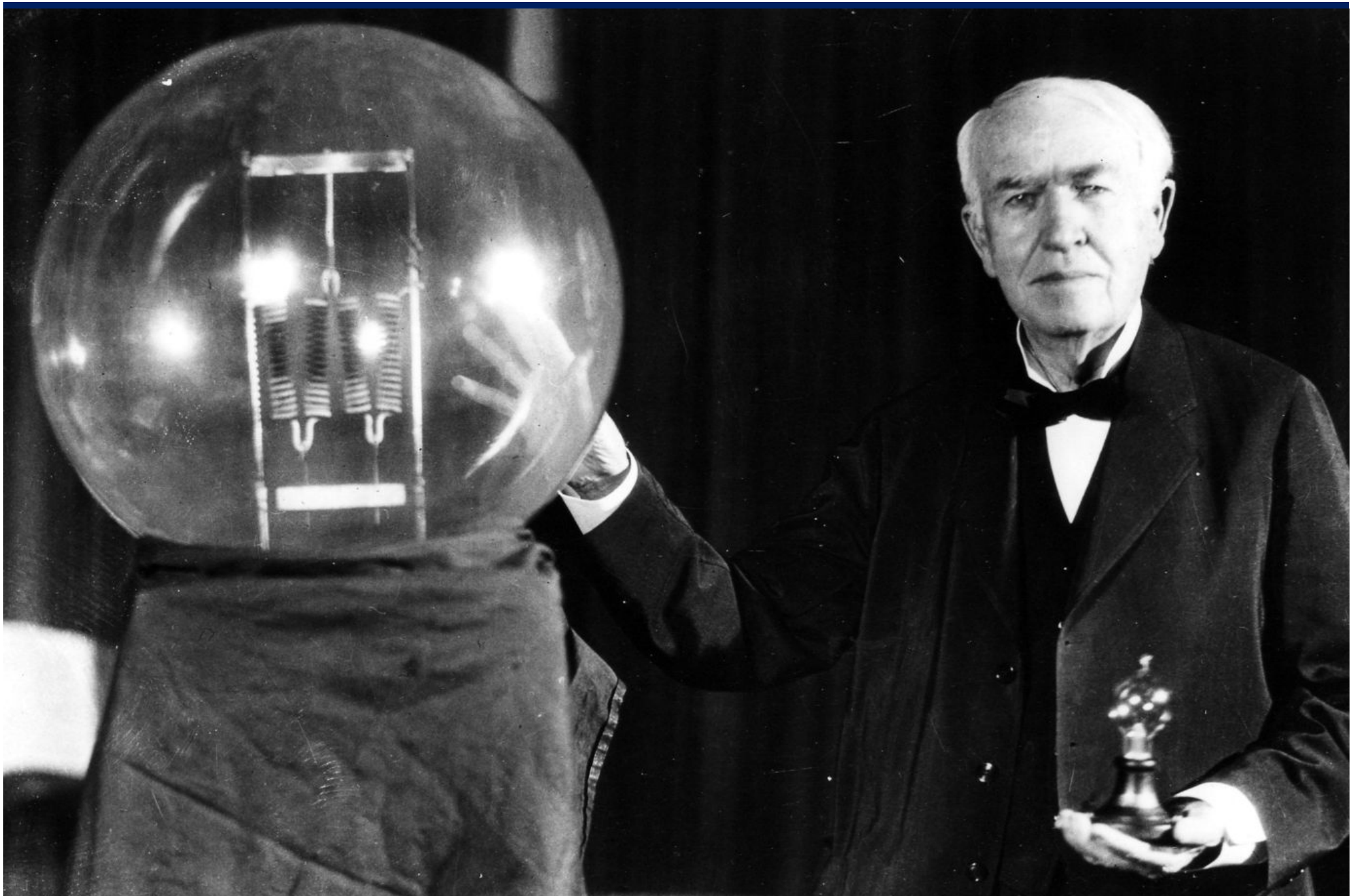


- ❖ **note : EDS (usually) distinct from complaint of “fatigue”**
other terms may also confuse (somnolent, drowsy, tired, weak ...)
can also be difficult to exclude motivational factors in mood disorders



*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”

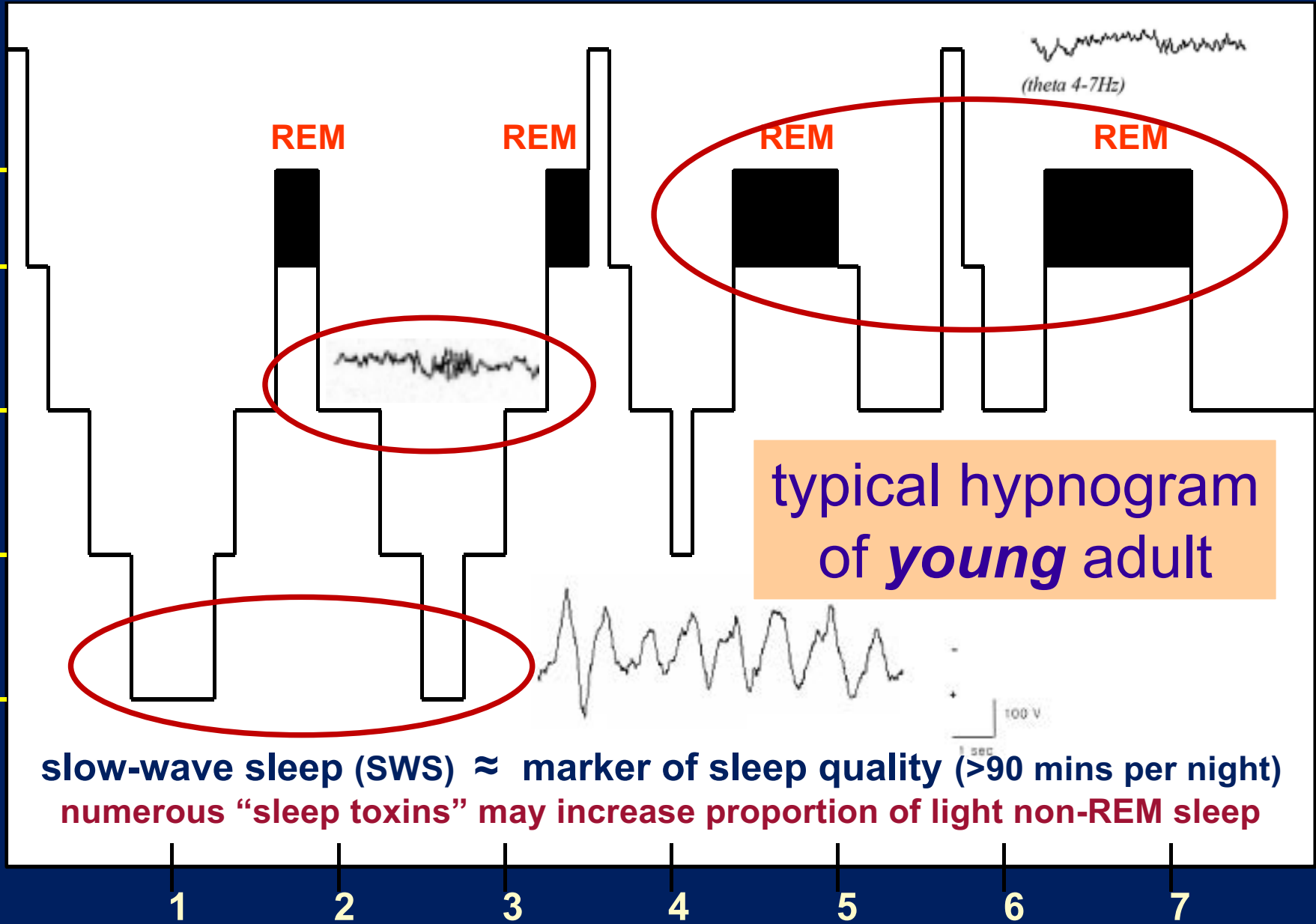
WAKING

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

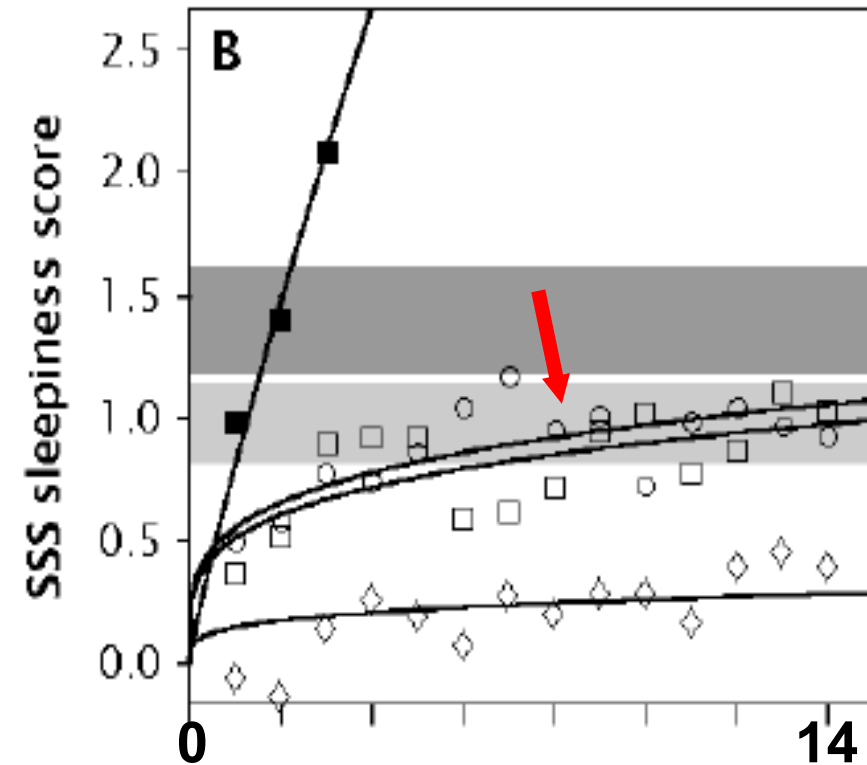
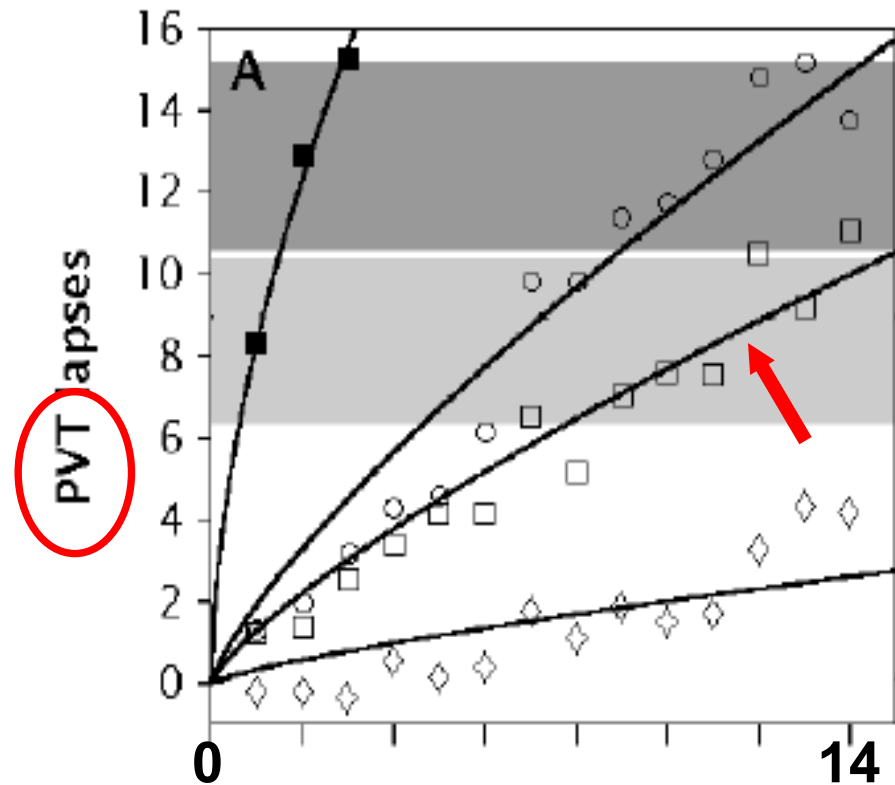
0 (would never doze) to

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

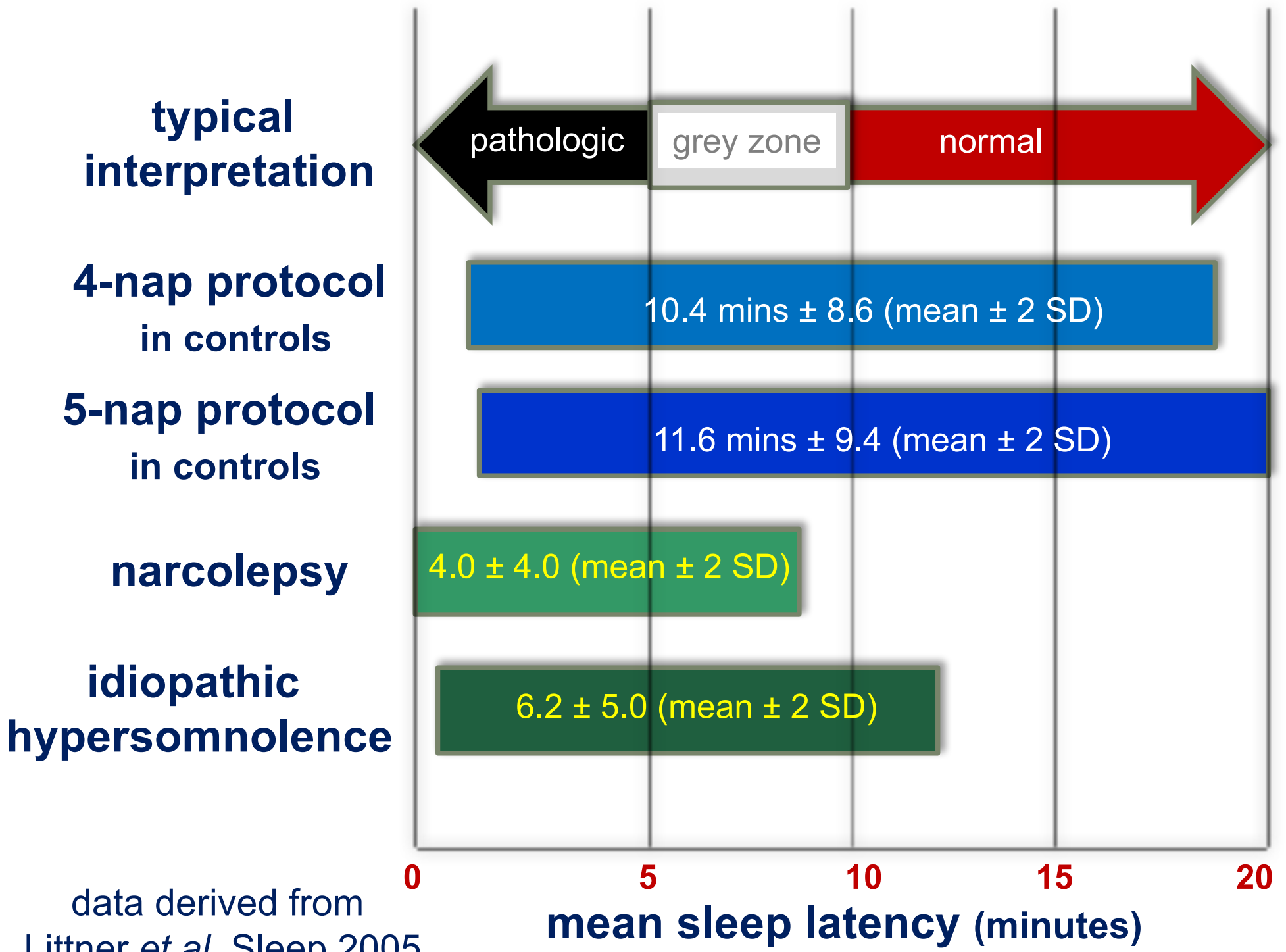
objective

❖ 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

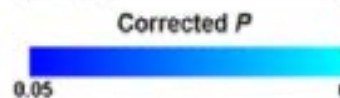
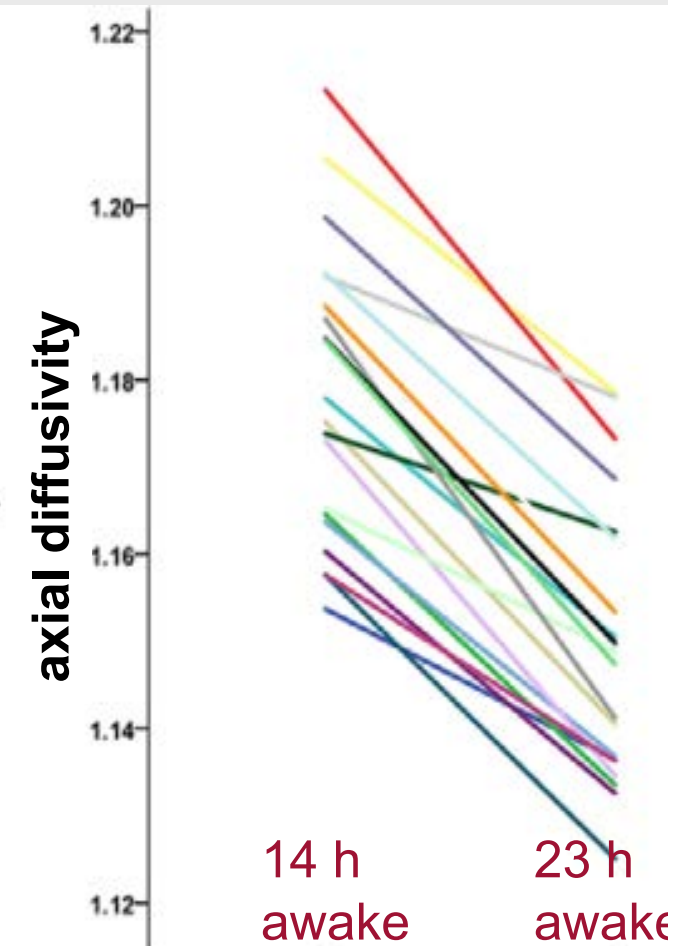
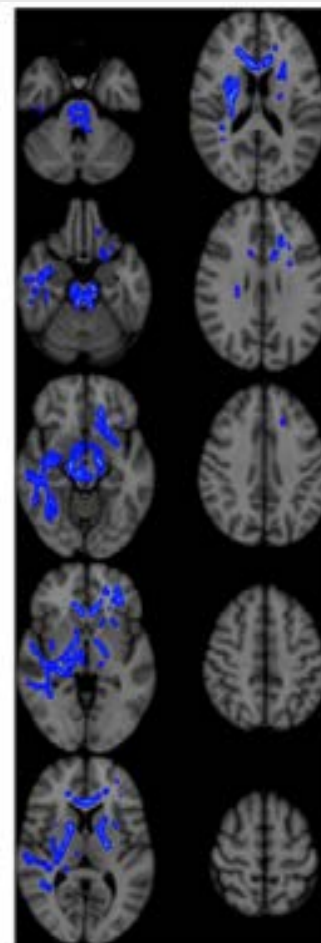
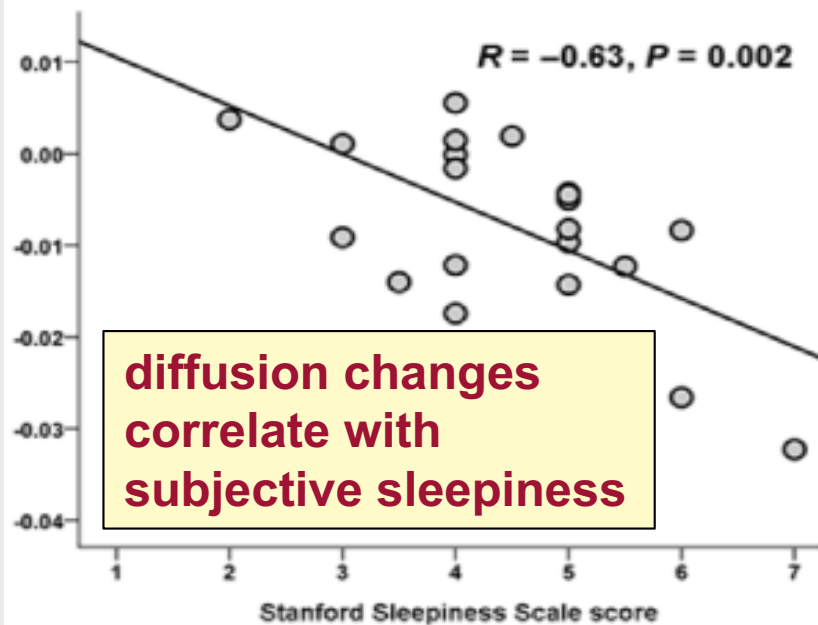
Structural brain imaging after acute sleep deprivation

- ❖ recent evidence for significant white matter tract changes
- diffusion tensor imaging (DTI) shows H₂O 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

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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**

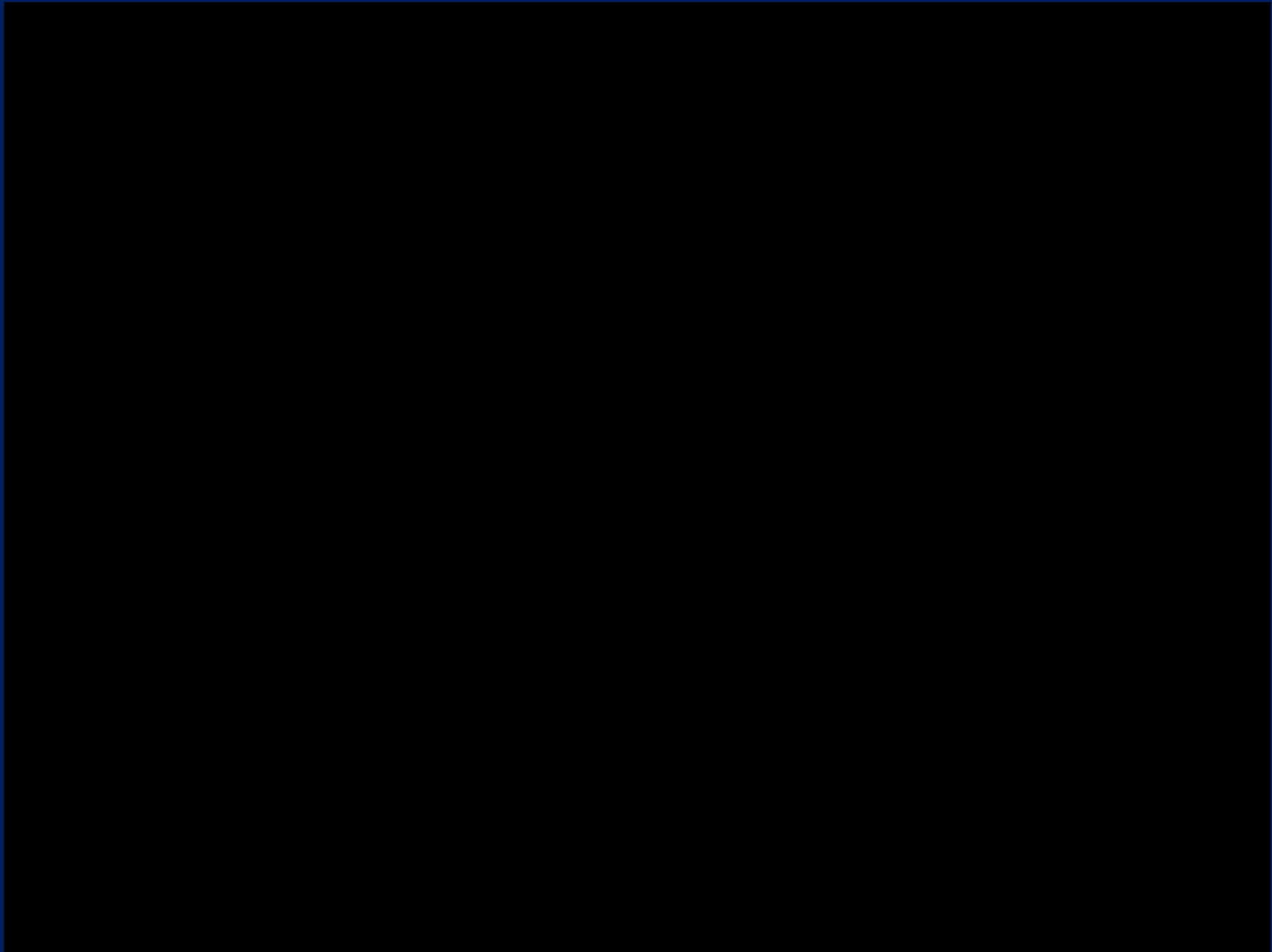
Sleepiness Secondary to a Chronic Disorder

- **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)

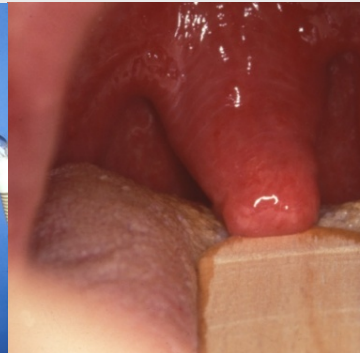
- ❖ usually easy to pick up from history / phenotype
 - male, overweight, neck circumference > 17"
 - don't overlook retrognathia, large tonsils
 - ~4% middle-aged men (2% women)
 - unrefreshing sleep with severe snoring/pauses
 - nocturia, dry mouth in morning, worse > alcohol



- ❖ 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?

