

# Waking up to the power of sleep: evidence-based solutions for insomnia

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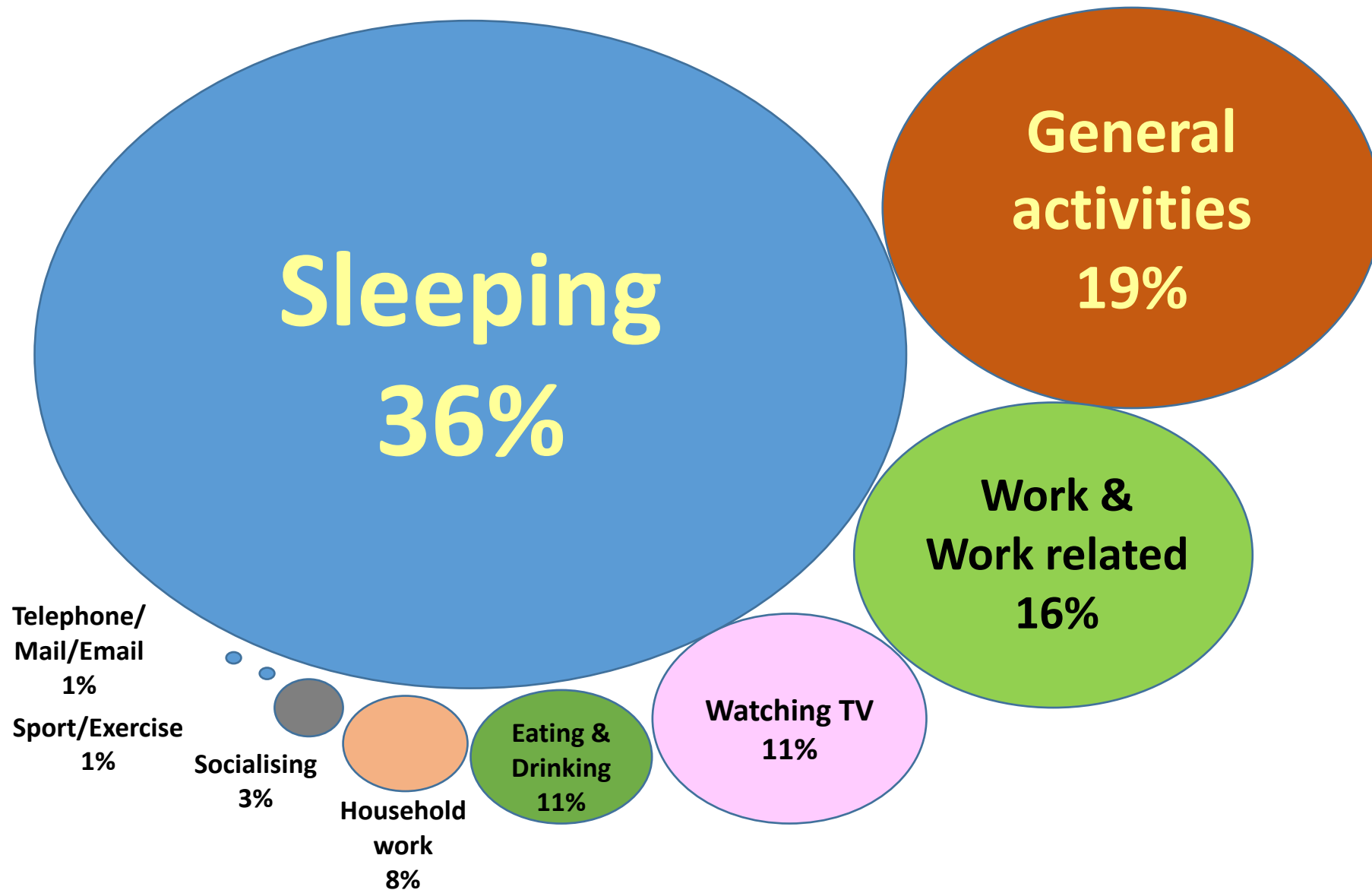




# Plan

- Sleep is universal and essential
  - There can be major consequences to insufficient sleep
  - Insufficient sleep can result from lifestyle choices or from a sleep disorder
- Sleep is complex
  - Sleep has its phases and stages
  - It varies across our lifespan and it varies by person
- Value your sleep
  - Prioritise and protect it
  - Get help if you have a sleep disorder

# Lifetime Behaviour



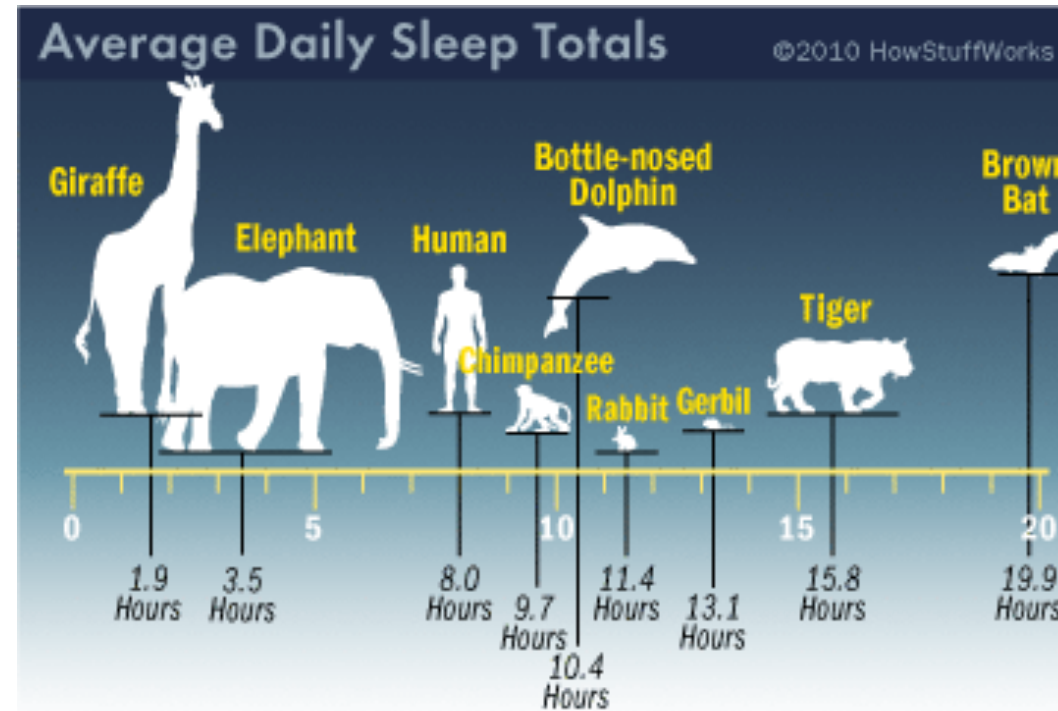
Data from - American Time Use Survey Summary 2011

<http://www.bls.gov/tus/>

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# Sleep is essential: not a “nice to have”

- For all creatures
- Total amounts and timing of sleep vary by species
- Experimental animals die in 11-32 days if deprived of sleep



Cirelli & Tononi, 2008; Everson et al, 1989



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## Man claims new sleepless record

**A Cornish man says he has broken the world record for sleep deprivation by staying awake for 11 days and nights.**

Tony Wright, 42, from Penzance, was trying to beat the Guinness world record of 264 sleepless hours set by Randy Gardner in the US in 1964.



How man pushed sleepless limits

He fought off tiredness by drinking tea, playing pool and keeping a diary.

The Guinness Book of Records has since withdrawn its backing of a sleep deprivation class because of the associated health risks.



Cirelli & Tononi, 2000; Zie at al, 2013; Siegel, 2008; Imeri & Opp, 2009; Cappuccio et al, 2010; Kahn et al, 2013; Stickgold, 2005; Diekelmann et al, 2009

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# Sleep deprivation and circadian misalignment confer significant risk

<b>Physical</b>	<b>Mental</b>	<b>Behavioural</b>	<b>Performance</b>
Risk of cancer	Risk of depression	Risk of sleepiness	Impaired attention and concentration
Cardiovascular disease and stroke	Psychiatric relapse	Road traffic accidents	Decreased memory
Disorders of the HPA	Mood fluctuation	Falls and fractures	Reduced multi-tasking
Metabolic abnormalities	Delirium	Repeat prescribing	Impaired decision-making
Weight gain and obesity	Impulsivity	Alcohol and drug dependency	Reduced creativity
Reduced immunity	Anger and frustration	Increased sedative and stimulant use	Reduced communication
Bodily sensations of pain	Higher risk of suicide	Less likely to attend appointments	Reduced socialisation
Thermoregulatory problems	Anxiety and hyperarousal	Longer stay in hospital	Less likely to be employed
Vulnerable seizure threshold	Chronic fatigue	Earlier admission to long-term care	More likely to be on benefits





# Drowsy driving? .... Me?

- Difficulty focusing, frequent blinking, or heavy eyelids
- Daydreaming; wandering/disconnected thoughts
- Trouble remembering the last few miles driven; missing exits or traffic signs
- Yawning repeatedly or rubbing your eyes
- Trouble keeping your head up
- Drifting from your lane, tailgating, or hitting rumble strip
- Feeling restless and irritable
- Impairment to recognition of sleepiness and failure to act



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VISION, VOICE AND PRACTICE

# Waking up to the health benefits of sleep



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**POSTNOTE**

Number 585 September 2018

## Sleep and Health

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**POSTNOTE**

Number 586 September 2018

## Shift Work, Sleep and Health

# Electroencephalogram (EEG) showing typical brain waves of sleep and wakefulness

wakefulness (relaxed state)



stage 1

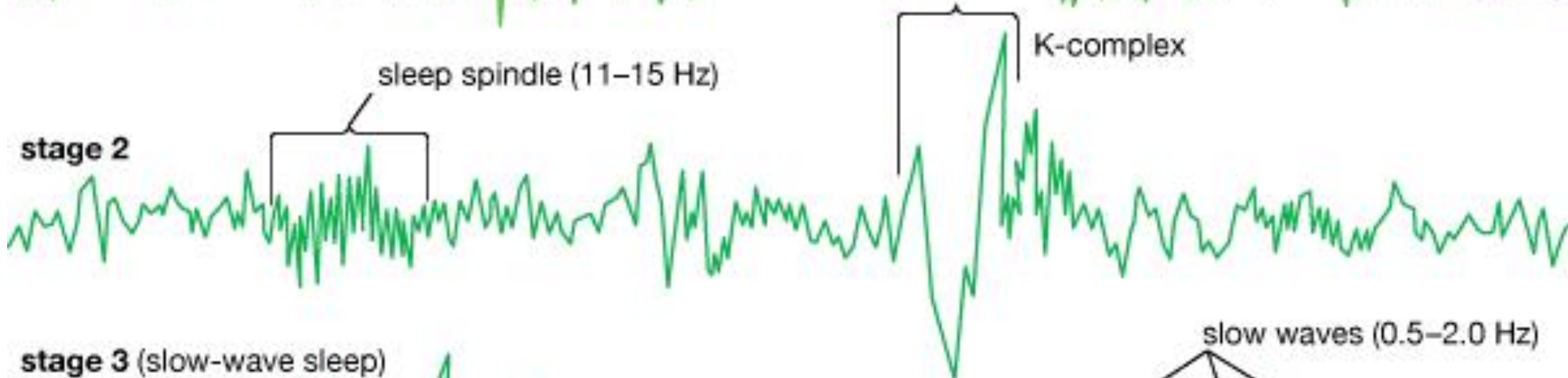
theta waves (4–7 Hz)



stage 2

sleep spindle (11–15 Hz)

K-complex

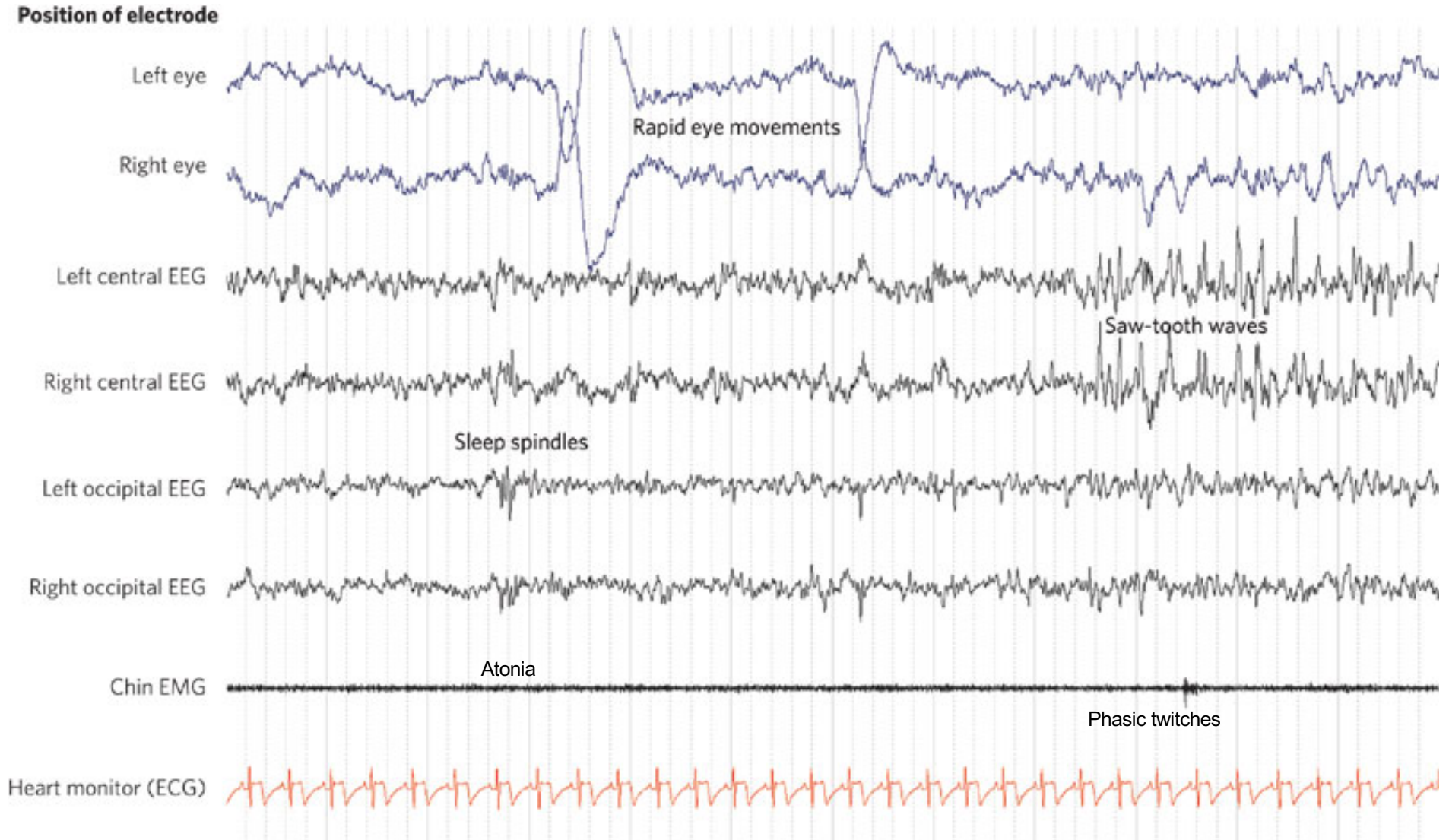


stage 3 (slow-wave sleep)

slow waves (0.5–2.0 Hz)

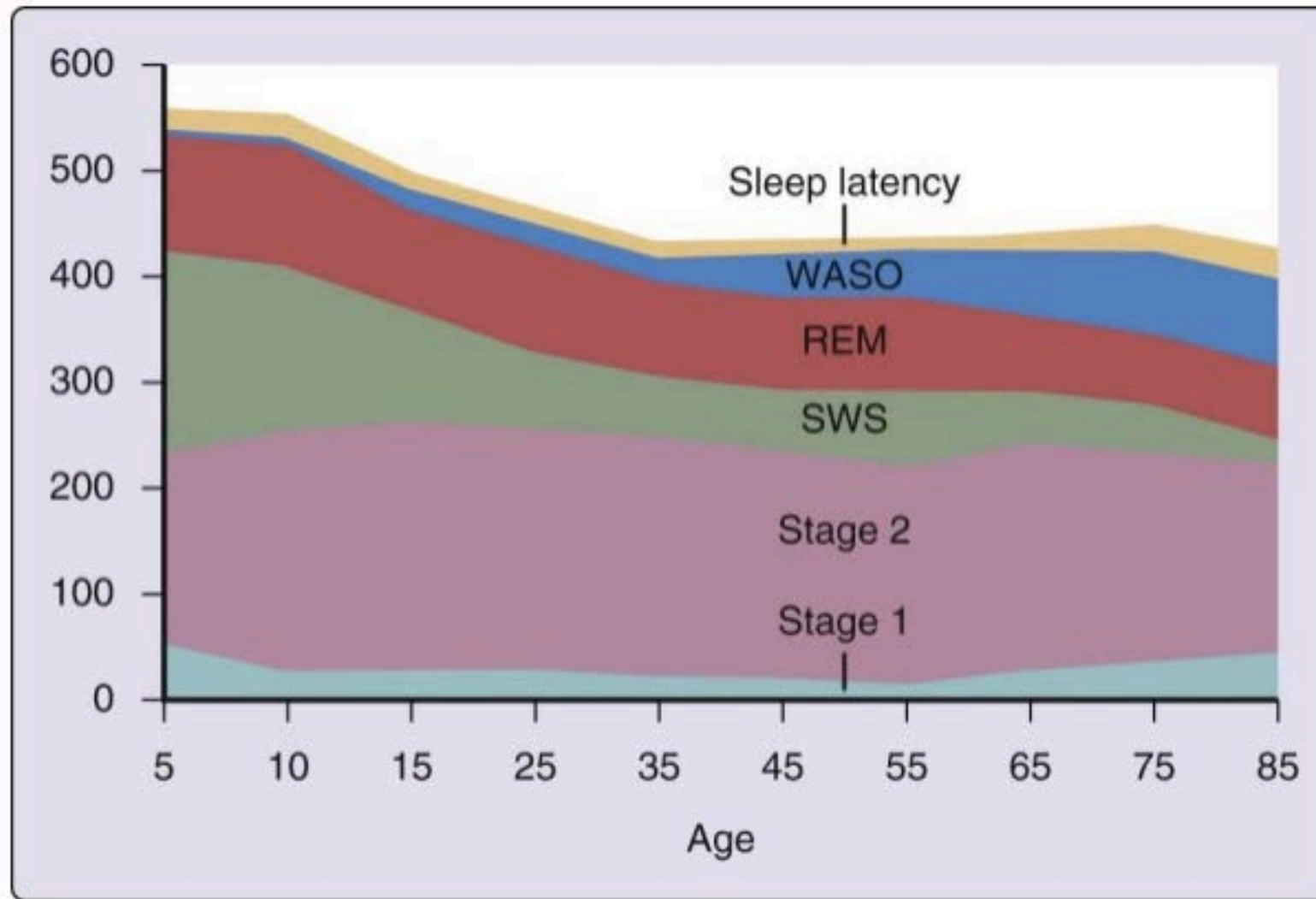


# REM sleep: EEG, EMG, and EOG characteristics





# Sleep architecture changes over the lifecourse



Ohayon M, Carskadon MA, Guilleminault C, et al. Meta-analysis of quantitative sleep parameters from childhood to old age in healthy individuals: developing normative sleep values across the human lifespan. *Sleep* 2004;27:1255-1273.

# Disorders of sleep

International Classification of Sleep Disorders (ICSD-3)
<b>Sleep Related Breathing Disorders</b>
<b>Sleep Related Movement Disorders</b>
<b>Central disorders of Hypersomnolence</b>
<b>Parasomnias</b>
<b>Insomnias</b>
<b>Circadian Rhythm Sleep-Wake Disorders</b>





# Insomnia treatment guidelines



**1999**  
**2006**



**2005**



**2010**  
**2019**



**2016**

American College of Physicians  
Leading Internal Medicine, Improving Lives



**2017**




# European Insomnia Guideline

2017

*J Sleep Res.* (2017)

Review Paper

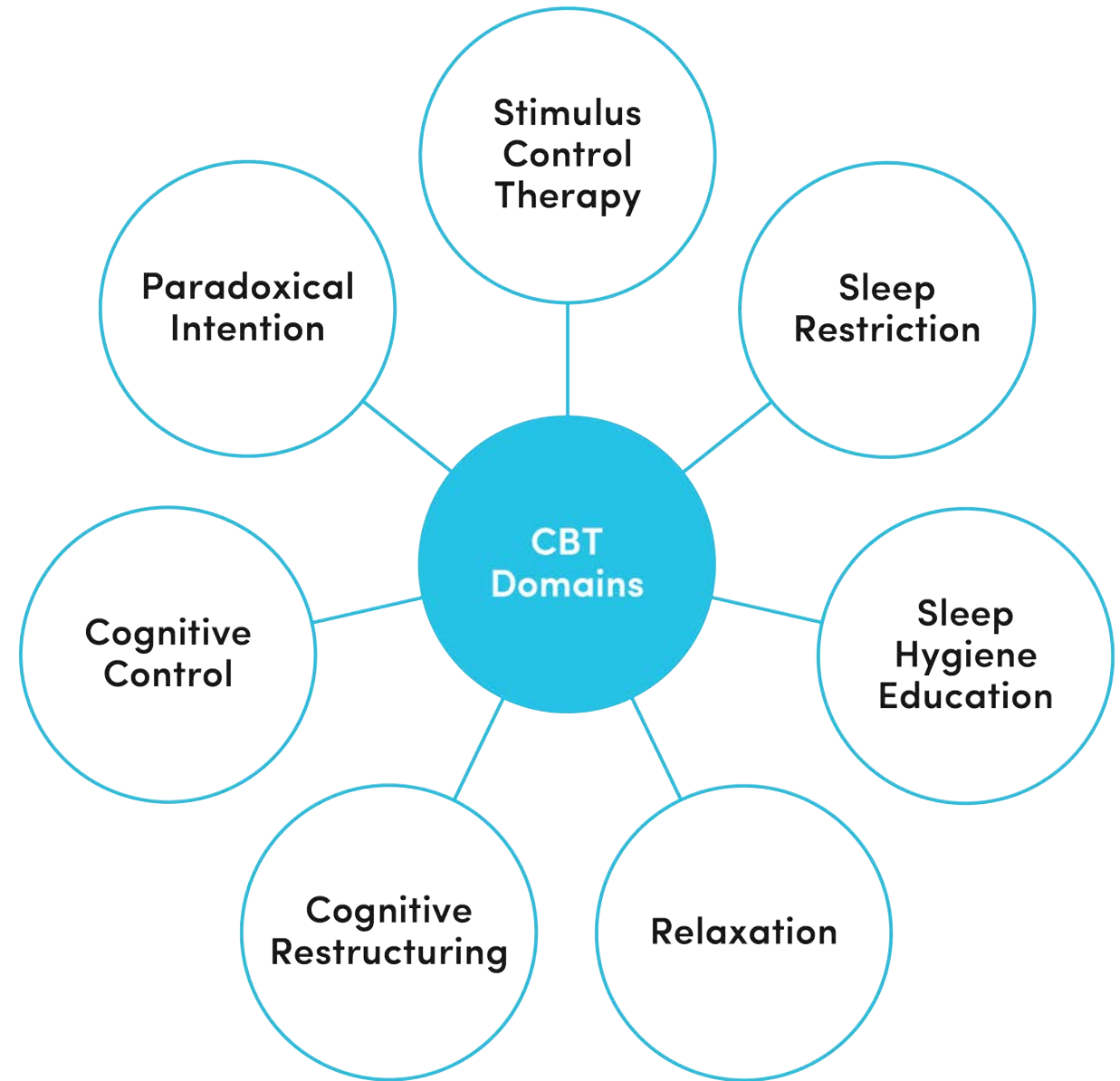
## European guideline for the diagnosis and treatment of insomnia

DIETER RIEMANN<sup>1</sup> , CHIARA BAGLIONI<sup>1</sup>, CLAUDIO BASSETTI<sup>2</sup>,  
BJØRN BJORVATN<sup>3</sup> , LEJA DOLENC GROSELJ<sup>4</sup>, JASON G. ELLIS<sup>5</sup>,  
COLIN A. ESPIE<sup>6</sup>, DIEGO GARCIA-BORREGUERO<sup>7</sup>, MICHAELA GJERSTAD<sup>8</sup>,  
MARTA GONÇALVES<sup>9</sup>, ELISABETH HERTENSTEIN<sup>1</sup>,  
MARKUS JANSSON-FRÖJMARK<sup>10</sup>, POUL J. JENNUM<sup>11</sup>, DAMIEN LEGER<sup>12</sup>,  
CHRISTOPH NISSEN<sup>1,2,13</sup>, LIBORIO PARRINO<sup>14</sup> , TIINA PAUNIO<sup>15</sup>,  
DIRK PEVERNAGIE<sup>16</sup>, JOHAN VERBRAECKEN<sup>17</sup>, HANS-GÜNTER WEEß<sup>18</sup>,  
ADAM WICHNIAK<sup>19</sup>, IRINA ZAVALKO<sup>20</sup>, ERNA S. ARNARDOTTIR<sup>21,†</sup>,  
OANA-CLAUDIA DELEANU<sup>22,†</sup>, BARBARA STRAZISAR<sup>23,†</sup>, MARIELLE  
ZOETMULDER<sup>24,†</sup> and KAI SPIEGELHALDER<sup>1</sup>

- ◆ Cognitive Behavioural Therapy (CBT) is recommended as first-line treatment for chronic insomnia in adults of any age (strong recommendation, high-quality evidence).
- ◆ A pharmacological intervention can be offered if CBT is not effective or not available

Riemann et al *JOSR* (2017) DOI: [10.1111/jsr.12594](https://doi.org/10.1111/jsr.12594)

CBT is a system of evidence-based therapeutics for insomnia



Based on Espie & Kyle (2012).

Chapter 12: Cognitive Behavioral and Psychological Therapies for Chronic Insomnia; Therapy in Sleep Medicine ed. Barkoukis et al.

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REVIEW ARTICLES

JCSM

# Journal of Clinical Sleep Medicine

pii: jc-00498-14

<http://dx.doi.org/10.5664/jcsm.5288>

## Consumer Sleep Technologies: A Review of the Landscape

Ping-Ru T. Ko, MD<sup>1</sup>; Julie A. Kientz, PhD<sup>2</sup>; Eun Kyoung Choe, PhD<sup>3</sup>; Matthew Kay, MS<sup>4</sup>; Carol A. Landis, PhD, RN, FAAN<sup>5</sup>;  
Nathaniel F. Watson, MD, MSc<sup>6</sup>

<sup>1</sup>*Division of Pulmonary and Critical Care Medicine, Department of Medicine, University of Washington, Seattle, WA;* <sup>2</sup>*Human Centered Design & Engineering, University of Washington, Seattle, WA;* <sup>3</sup>*College of Information Sciences and Technology, Pennsylvania State University, State College, PA;* <sup>4</sup>*Computer Science & Engineering, University of Washington, Seattle, WA;* <sup>5</sup>*Biobehavioral Nursing and Health Systems, School of Nursing, University of Washington, Seattle, WA;* <sup>6</sup>*Department of Neurology, University of Washington, Seattle, WA*

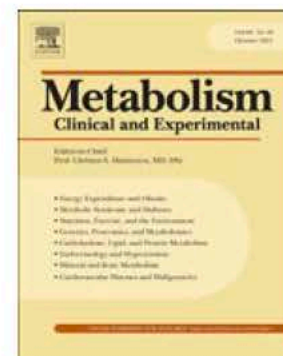
*“Consumer sleep technologies are changing the landscape of sleep health and clinical sleep medicine. These technologies **have the potential to both improve and impair** collective and individual sleep health depending on method of implementation”*



Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

# Metabolism

[www.metabolismjournal.com](http://www.metabolismjournal.com)



## Sleep devices: wearables and nearables, informational and interventional, consumer and clinical



Matt T. Bianchi\*

Neurology Department, Massachusetts General Hospital, Wang 720, Boston, MA 02114, United States

Division of Sleep Medicine, Harvard Medical School, Boston, MA, 02115, United States

*“This review highlights recent developments in consumer and clinical devices for sleep, emphasizing the **need for validation at multiple levels**, with the ultimate goal of using personalized data and advanced algorithms to provide actionable information that will improve sleep health”*

2019



8 published RCTs  
n ~ 3,100 participants



8 published RCTs  
n ~ 6,900 participants



# Some advice to establish healthy sleep

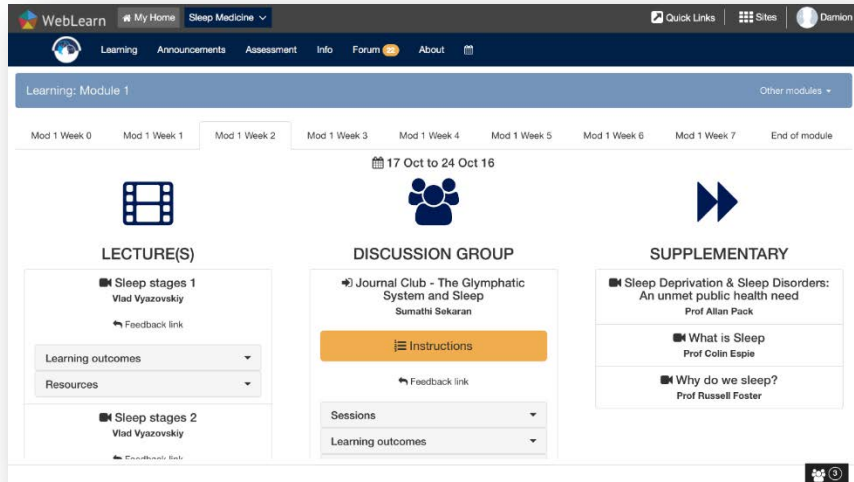
1. Work out how much sleep you need
2. Consider best sleep period time for you (owl/ lark?)
3. Establish your pattern and protect it
4. Maintain good 'sleep hygiene'
5. Put the day to rest
6. Never try to sleep
7. If you have a sleep disorder get it treated



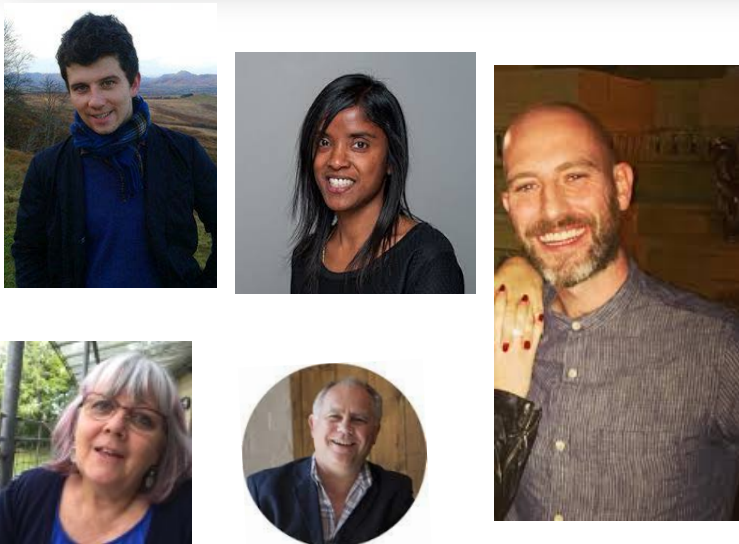


# The Oxford Online Programme in Sleep Medicine

Colin Espie, Simon Kyle, Christopher-James Harvey, Sumathi Sekaran, Nicola Barclay, Marion Greenleaves



- Leads to a MSc, PGDip or CPD
- 8 Sleep Medicine Modules (+2 research skills)
- Recorded lectures & live online seminars
- Started Oct 2016
- Health professionals from 31 countries



## The Ascending Reticular Activating System - ARAS (Reticular Formation)

Neurons of the ARAS produce neurotransmitters

- Acetylcholine (Ach)
- Norepinephrine (NE)
- Dopamine (DA)
- Serotonin (5-HT)
- Histamine (HA)
- Orexin/hypocretin

Excitatory effects on target neurons throughout the cortex promote arousal

- $\gamma$ -aminobutyric acid (GABA)

Inhibitory effects on target neurons

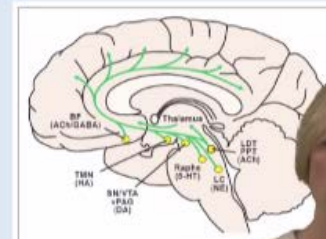


Figure 1—A variety of neuroanatomical systems project to the forebrain. Cortical and subcortical monoaminergic neurotransmitters include the locus coeruleus (LC), serotonin (5-HT) raphe nucleus, histamine (HA) from the tuberomammillary nucleus (TMN), and dopamine (DA) from the substantia nigra and ventral tegmental area (SN/VTA). The brainstem (BF) generates cortical activation and  $\gamma$ -aminobutyric acid (GABA). Neuroendocrine hypothalamic nuclei (LDT) neurons in the thalamus, hypothalamus, and





## Experimental & Clinical Sleep Medicine

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Dr Nicola Barclay

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Dr Gaby Illingworth

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Dr Jules Schneider

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Dr Claire Sexton

Donna Littlewood

Heather Condon

Matt Reid

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Dr Jenna Carl

Dr Jen Kanady

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### Honorary

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