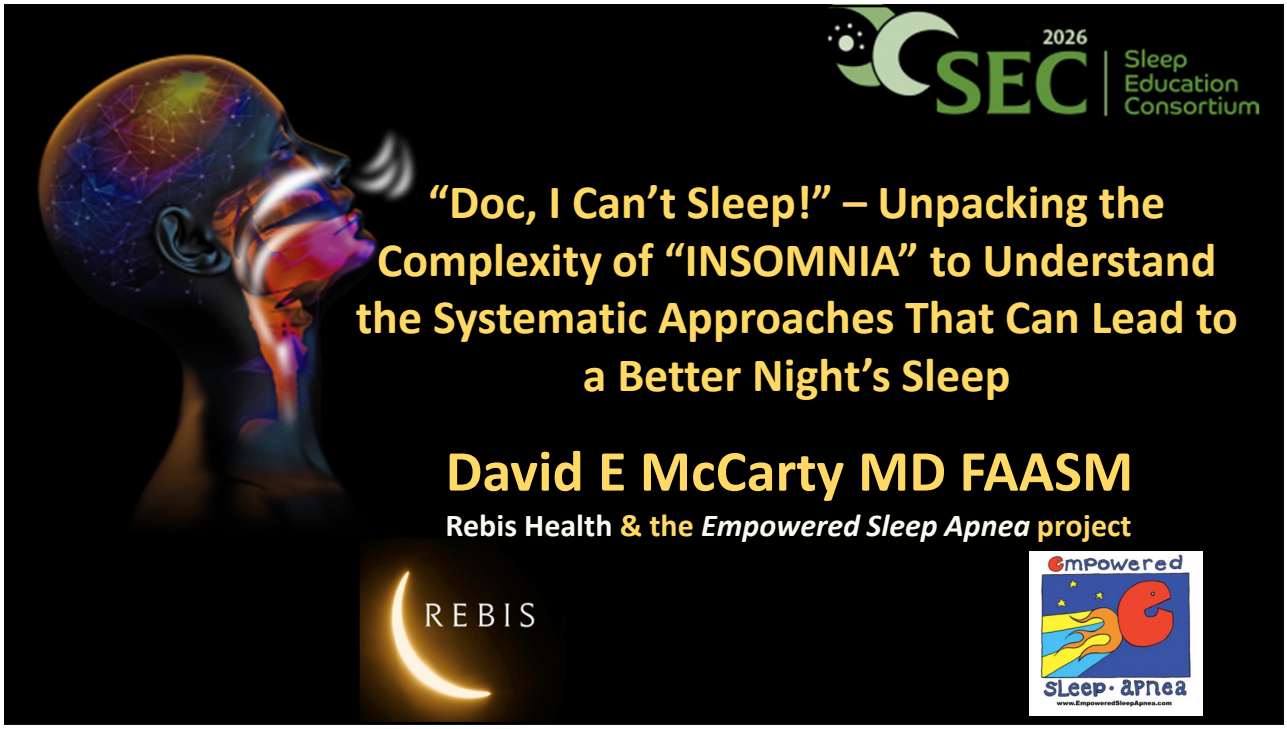
2026
SEC
Sleep
Education
Consortium
"Doc, I Can't Sleep!" – Unpacking the Complexity of "INSOMNIA" to Understand the Systematic Approaches That Can Lead to a Better Night's Sleep
David E McCarty MD FAASM
Rebis Health & the Empowered Sleep Apnea project
REBIS
Empowered
Sleep · apnea

1


demystifying
insomnia
2026
SEC
Sleep Education Consortium
April 24-25, 2026
Houston, TX
Sleep
Education
Consortium
David E McCarty, MD, FAASM
Co-creator, Empowered Sleep Apnea project
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Chief Medical Officer, Rebis Health
www.RebisHealth.org
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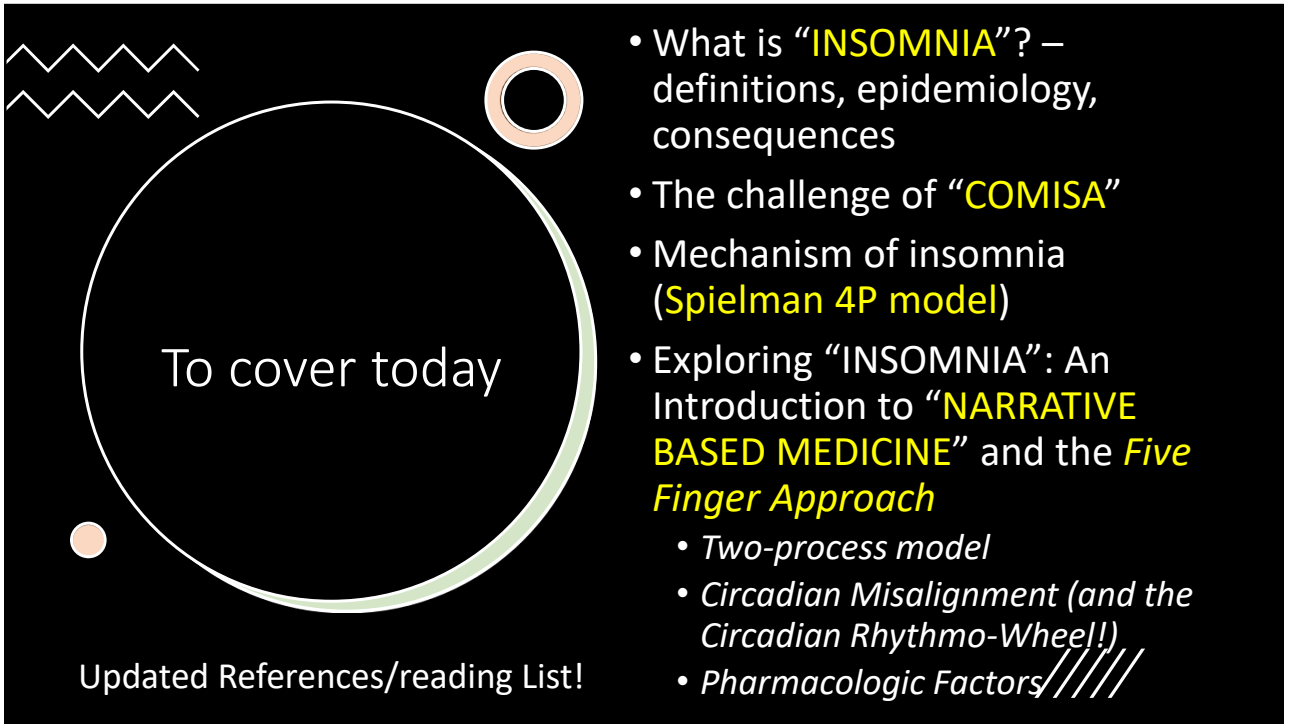
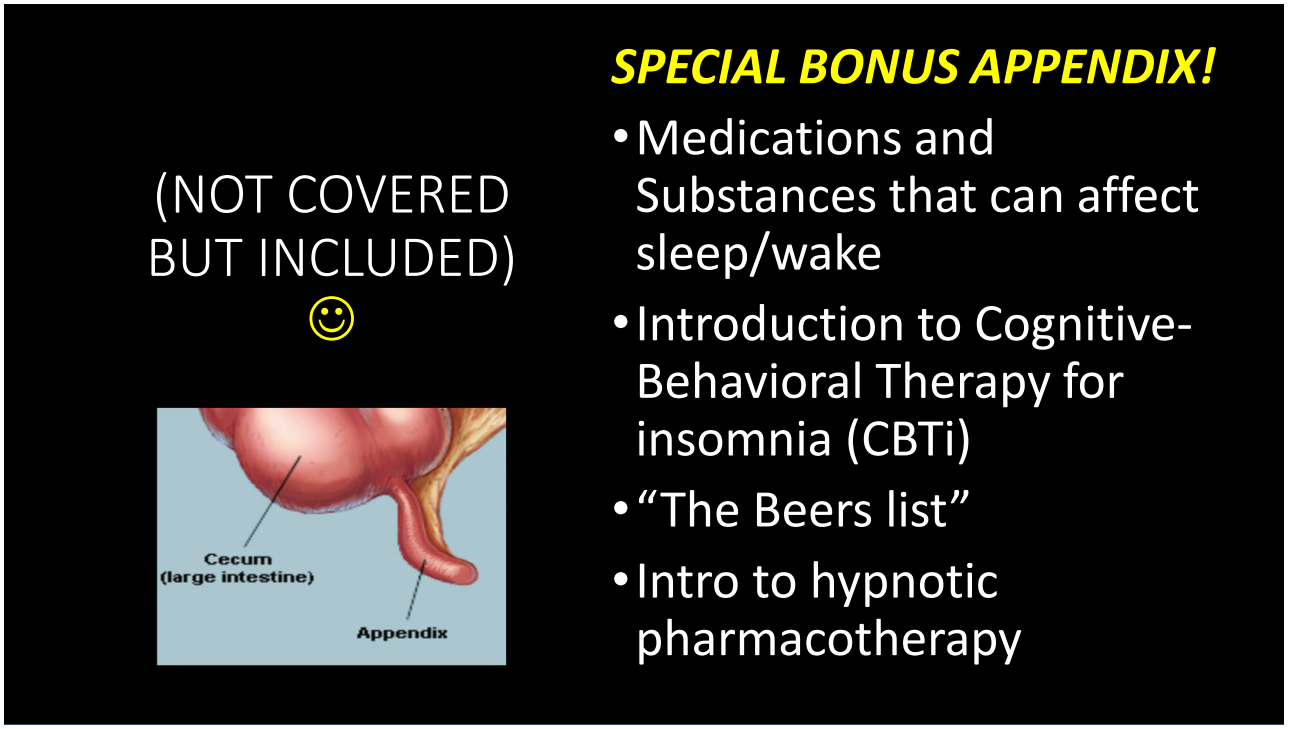
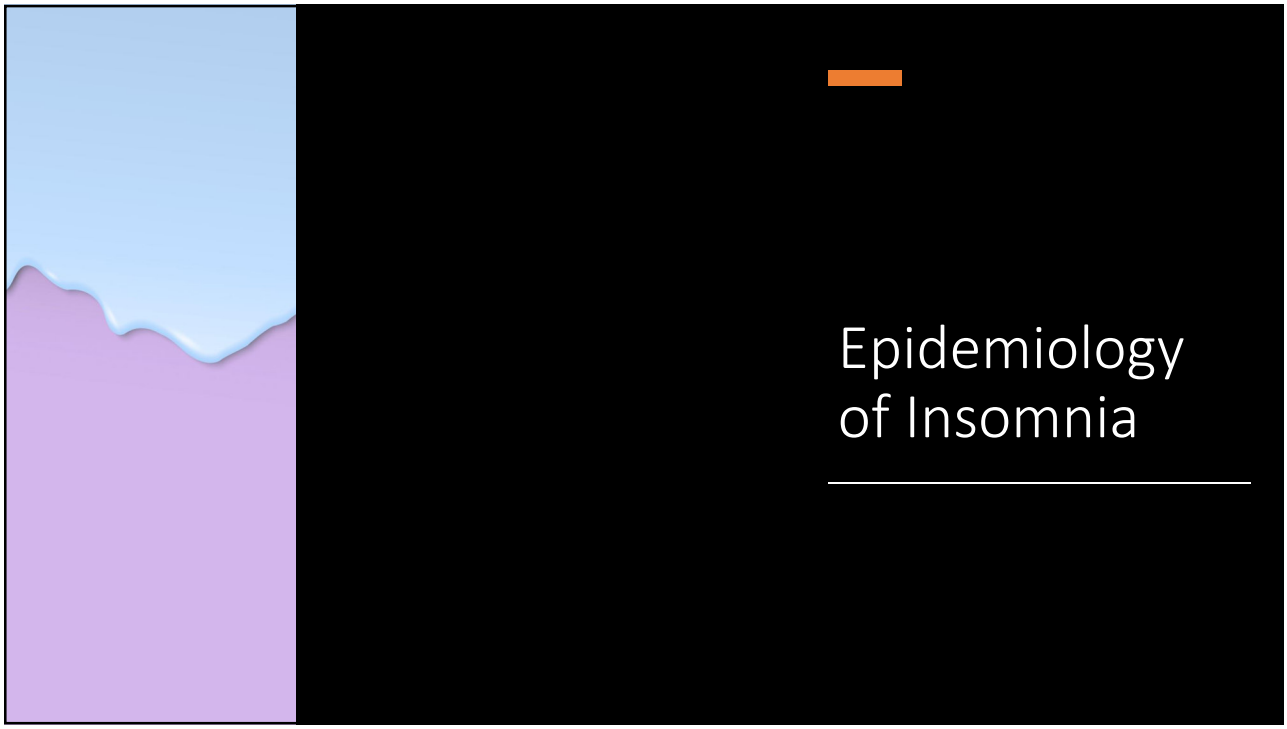
2


To cover today
Updated References/reading List!
• What is "INSOMNIA"? – definitions, epidemiology, consequences
• The challenge of "COMISA"
• Mechanism of insomnia (Spielman 4P model)
• Exploring "INSOMNIA": An Introduction to "NARRATIVE BASED MEDICINE" and the *Five Finger Approach*
• *Two-process model*
• *Circadian Misalignment (and the Circadian Rhythmo-Wheel!)*
• *Pharmacologic Factors*

3


(NOT COVERED BUT INCLUDED)
☺
Cecum (large intestine)
Appendix
SPECIAL BONUS APPENDIX!
• Medications and Substances that can affect sleep/wake
• Introduction to Cognitive-Behavioral Therapy for insomnia (CBTi)
• "The Beers list"
• Intro to hypnotic pharmacotherapy

4



5

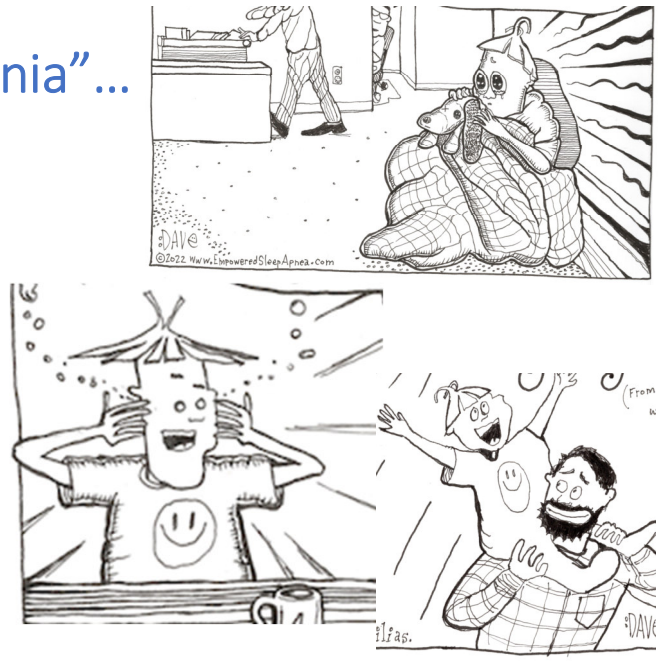
What is INSOMNIA ?

- DSM-5 and ICSD-3-TR = **difficulty initiating or maintaining sleep on ≥ 3 nights/wk for ≥ 3 months.**
  - DSM-5: **insomnia disorder**
  - ICSD-3-TR: **chronic insomnia disorder**
- **insomnia** = "**disorder**" rather than a "**disease**"
  - **Disorder**: "a disruption to the normal function of health"
    - (psst! may have "many moving parts" contributing…)
  - **Disease**: a problem with a known cause
    - Hereditary, physiologic, pathogenic, and deficiency

6

Before you call it "insomnia"…

- Must take into account:
  - Opportunity for sleep
  - Level of daytime impairment and distress
  - Whether symptom presentation varies with caregiver presence (pediatric)
  - **Insomnia is NOT better explained by other sleep disorders, meds or medical/psychiatric illness**



Cartoons by DE McCarty, appearing in Dave's Notes (official blog of the Empowered Sleep Apnea project), © 2022-2026 www.EmpoweredSleepApnea.com

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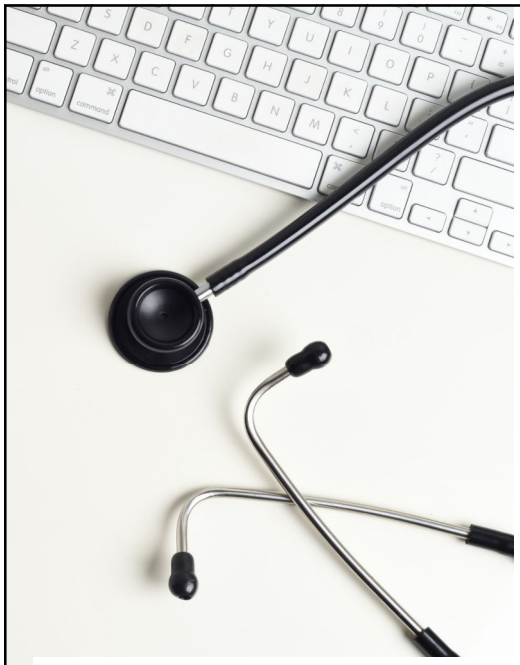

Teasing out the prevalence & risk of insomnia

- By definition: "**insomnia**" = "**can't sleep, despite opportunity to do so**"
- Is "tossy-turny," *subjectively problematic sleep* the same as "**insomnia**"?
  - People who experience this symptom will complain they "*can't sleep*", if they experience daytime impairment (a nonspecific symptom)
  - **Insomnia with short sleep time** is associated with different risks![1]
- Survey tools regarding insomnia vary, depending upon the study, leading to vastly different estimations of prevalence

1. Vgontzas AN, Liao D, Pejovic S, Calhoun S, Karataraki M, Basta M, Fernández-Mendoza J, Bixler EO. Insomnia with short sleep duration and mortality: the Penn State cohort. Sleep. 2010 Sep;33(9):1159-64.

8

Insomnia is common and may be a health risk

- Prevalence of chronic, clinically significant insomnia is ~10-15% in GenPop
- More common in:
  - Advancing age groups
  - Female gender
  - Low socioeconomic status
- Strong correlation with
  - Hyperarousal
  - Psychiatric / medical comorbidities
- **"insomnia with short sleep"** phenotype is associated with hypertension, diabetes, neurobehavioral performance impairments and increased mortality

Vgontzas AN, Liao D, Pejovic S, Calhoun S, Karataraki M, Basta M, Fernández-Mendoza J, Bixler EO. *Insomnia with short sleep duration and mortality: the Penn State cohort.* Sleep. 2010 Sep;33(9):1159-64.
Harari G, Gesser-Edelsburg A. *The Association of Sleeping Duration and Sleep Problems With All-Cause Mortality Among a Cohort of Industrial Workers Followed Up for 36 Years.* Am J Ind Med. 2026 May;69(5):372-381.

9

Medical problems can predispose to hyperarousal

- Chronic stimulation of the **sympathetic nervous system** leads to generalized up-regulation of the hypothalamic-pituitary-adrenal (HPA) axis
- Symptoms of such up-regulation include **difficulty sleeping** and **anxiety**

Examples of disorders that chronically stimulate the HPA axis:

- Obstructive sleep apnea
- Willis Ekbom Disease (aka restless legs syndrome)
- Congestive heart failure
- Diabetes
- Chronic pain
- PTSD

Gold AR. Functional somatic syndromes, anxiety disorders, and the upper airway: A matter of paradigms. Sleep Medicine Reviews 15 (2011) 389-401

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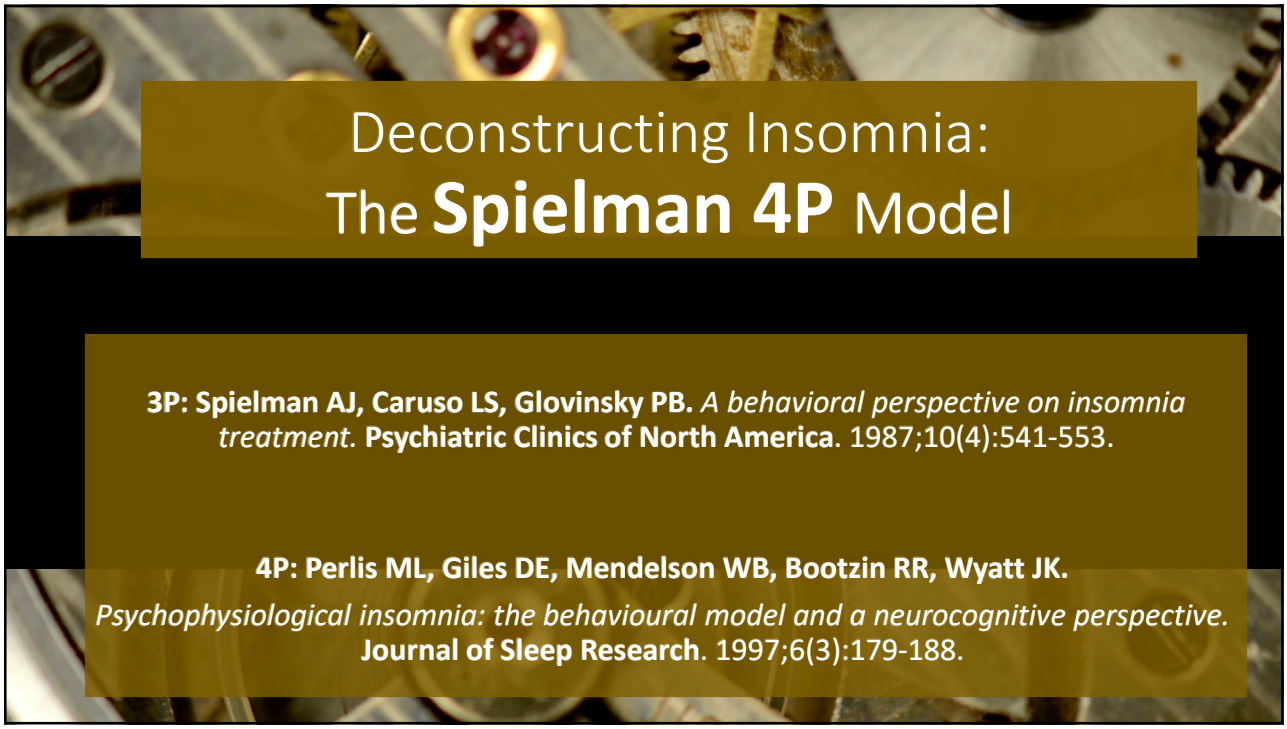


11

Understanding insomnia mechanism: The Spielman 4P model

- **P**redisposing Factors
  - Genetic alterations to neurotransmitter system
  - Medical factors provocative of hyperarousal
  - Psychological factors of tendency toward worry and excessive rumination
  - Social / environmental factors such as prescribed medications, environmental sleep disturbances, social pharmacologic exposure
- **P**recipitating Factors: life stress events (includes medical and psychiatric illness, social stressors)

12

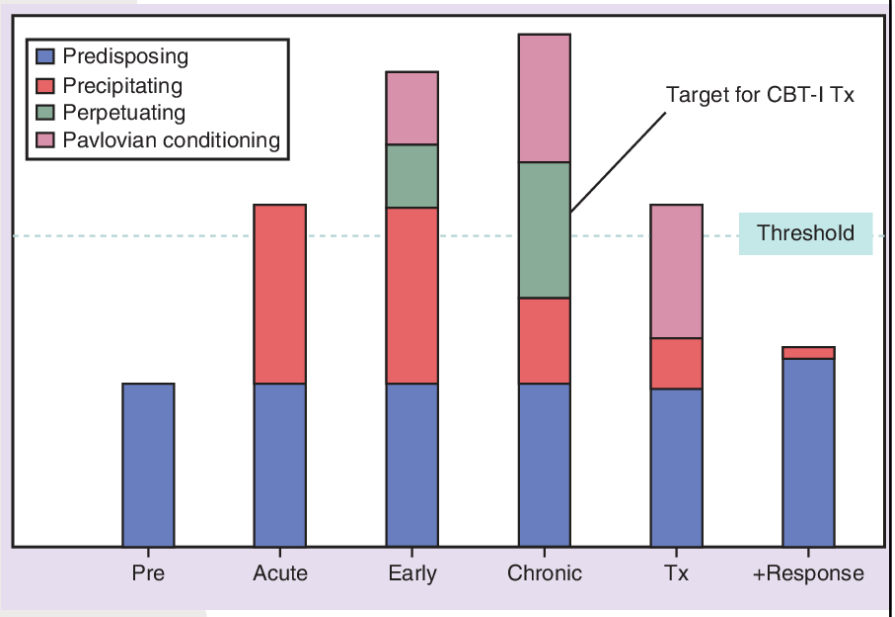
Understanding insomnia mechanism: The Spielman 4P model

- **Perpetuating Factors:** maladaptive behavioral choices and cognitive strategies to try to cope with problem
  - practice of non-sleep behaviors in bed
  - staying in bed while awake
  - engaging in sleep-phase delaying behaviors
  - engaging in behaviors that stimulate alertness when unable to sleep
  - spending excessive amount of time in bed
  - Increasing anxiety about sleep and potential consequences of sleep-deprivation
  - use of alcohol
- **Pavlovian Conditioning:** chronicity of problem leads to a ***conditioned response*** towards alertness in response to what were once sleep-related stimuli
  - ("it's as if I just walk into the bedroom, and I'm suddenly wide awake, like a switch got flipped from sleepy to wide-awake.")

13

Understanding insomnia mechanism:

The Spielman 4P model



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"COMISA": A Necessary Word—*and an incomplete one*!

- 18–42% prevalence (up to 67% in clinic)
- Worse outcomes than OSA or insomnia alone
- PAP adherence ↓ when insomnia present
- Concurrent CBTi + PAP shows benefit

Ong JC, Crawford MR, Wallace DM. *Sleep Apnea and Insomnia: Emerging Evidence for Effective Clinical Management.* Chest. 2021 May;159(5):2020-2028.

15

"The moment you tell a child the name of a bird, the child will never see that bird again."
—Jiddu Krishnamurti

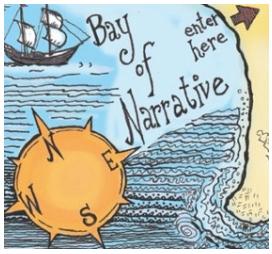
McCarty DE: "Just Birds"—cartoon featured in: **McCarty DE.** *The Tyranny of Labels…OR: Ode To The Nameless Bird.* In: *Dave's Notes* (official blog of the *Empowered Sleep Apnea* project). Published online15 August 2025.

16

Step One: *WHAAAA?*

- "**insomnia**" is a starting point, not a final reckoning
- Clarify nature of complaint (Establish NARRATIVE):
  - Difficulty falling asleep?
  - Difficulty staying asleep?
  - Too many awakenings?
  - Early terminal awakenings?
  - How often? What circumstances?
  - Daytime consequences?
  - Other health problems related?
- "2-Week Sleep Log"

17



NARRATIVE: it's different from a *LABEL…and a STARTING PLACE FOR THE JOURNEY!*

- Claudio Mahoney is a 43-year-old man with 4/10 sleep-wake satisfaction BECAUSE…
  - Difficulty getting to sleep, with the perception that it takes a long long time to get to sleep most nights
  - Difficulty maintaining sleep, with the sense that he has light stage sleep and has frequent brief awakenings
  - Curtailed total sleep time during the work week, due to the requirement to get up for work
  - A sense of feeling poorly refreshed upon awakening most days, with functionally limiting afternoon drowsiness

Cartoon: McCarty DE *Your Luxurious Destination.* In: McCarty DE & Stothard E. Empowered Sleep Apnea: A Handbook for Patients and the People Who Care About Them. BookBaby Press, NJ. 2022.

18

EXPLORING "INSOMNIA" with CURIOSITY:

The Five Finger Approach

A **NARRATIVE-BASED & PATIENT-CENTERED**
Collaborative Complexity Deconstruction Tool
to make sense of
Nonspecific Sleep-Wake Complaints

McCarty DE. Beyond Ockham's Razor: Redefining Problem-Solving in Clinical Sleep Medicine using a "Five Finger" Approach. J Clin Sleep Med 2010: 6(3): 292-296

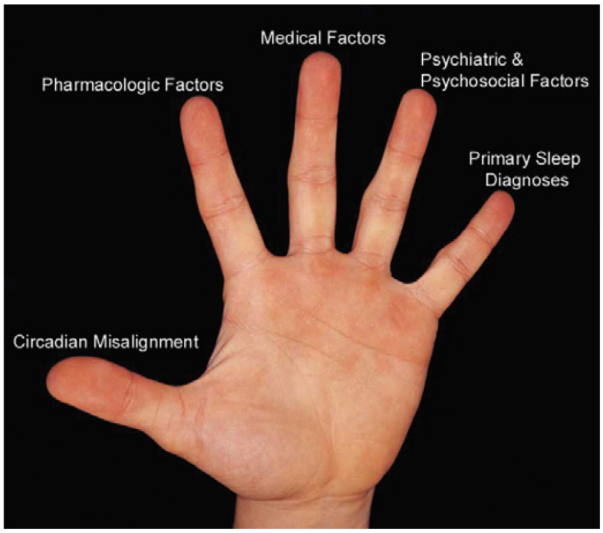
McCarty DE & Stothard E. *Empowered Sleep Apnea: A Handbook for Patients and the People Who Care About Them.* BookBaby Press, NJ. 2022. (www.EmpoweredSleepApnea.com)

19

The Five "Actionable" Domains of Clinical Sleep Medicine:

1. Circadian Misalignment
2. Pharmacologic Factors
3. Medical Factors
4. Psychiatric & Psychosocial Factors
5. Primary Sleep Diagnoses

Figure 1—The five domains of clinical sleep medicine (see text)



McCarty DE. Beyond Ockham's razor: redefining problem-solving in clinical sleep medicine using a "five-finger" approach. J Clin Sleep Med. 2010 Jun 15;6(3):292-6.

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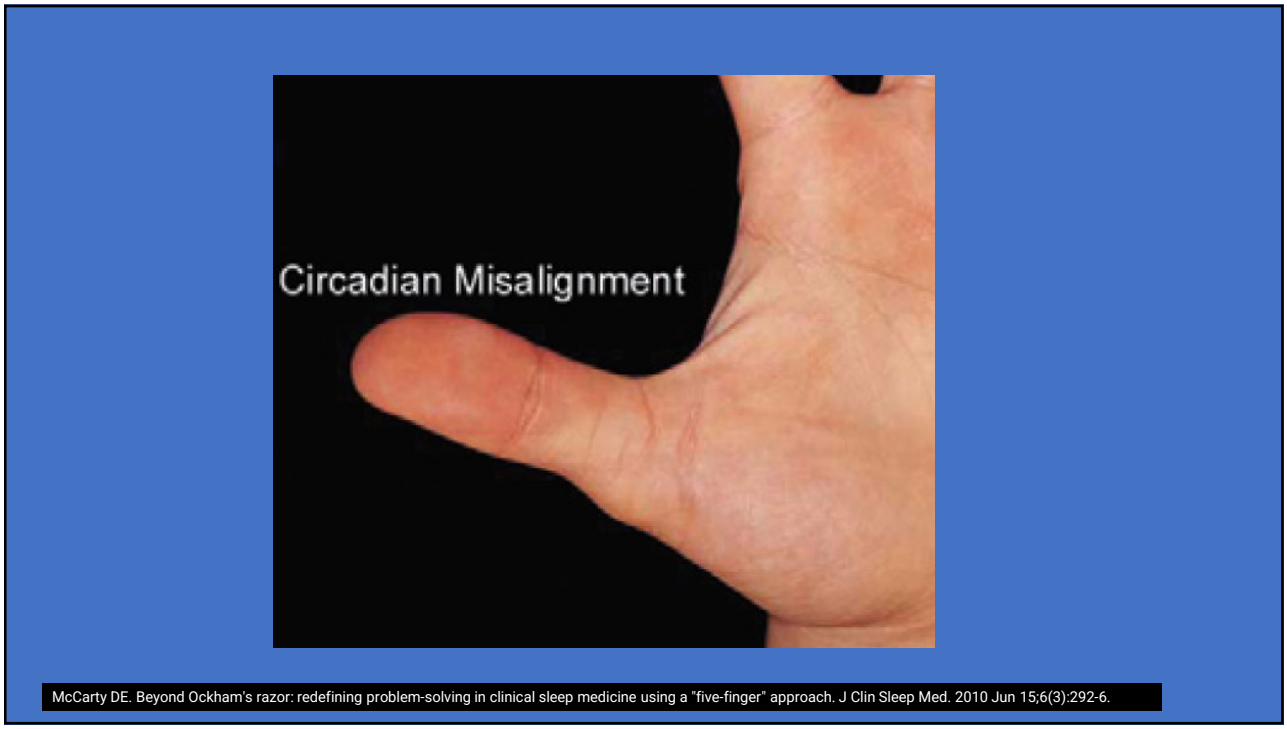
Circadian Misalignment
McCarty DE. Beyond Ockham's razor: redefining problem-solving in clinical sleep medicine using a "five-finger" approach. J Clin Sleep Med. 2010 Jun 15;6(3):292-6.

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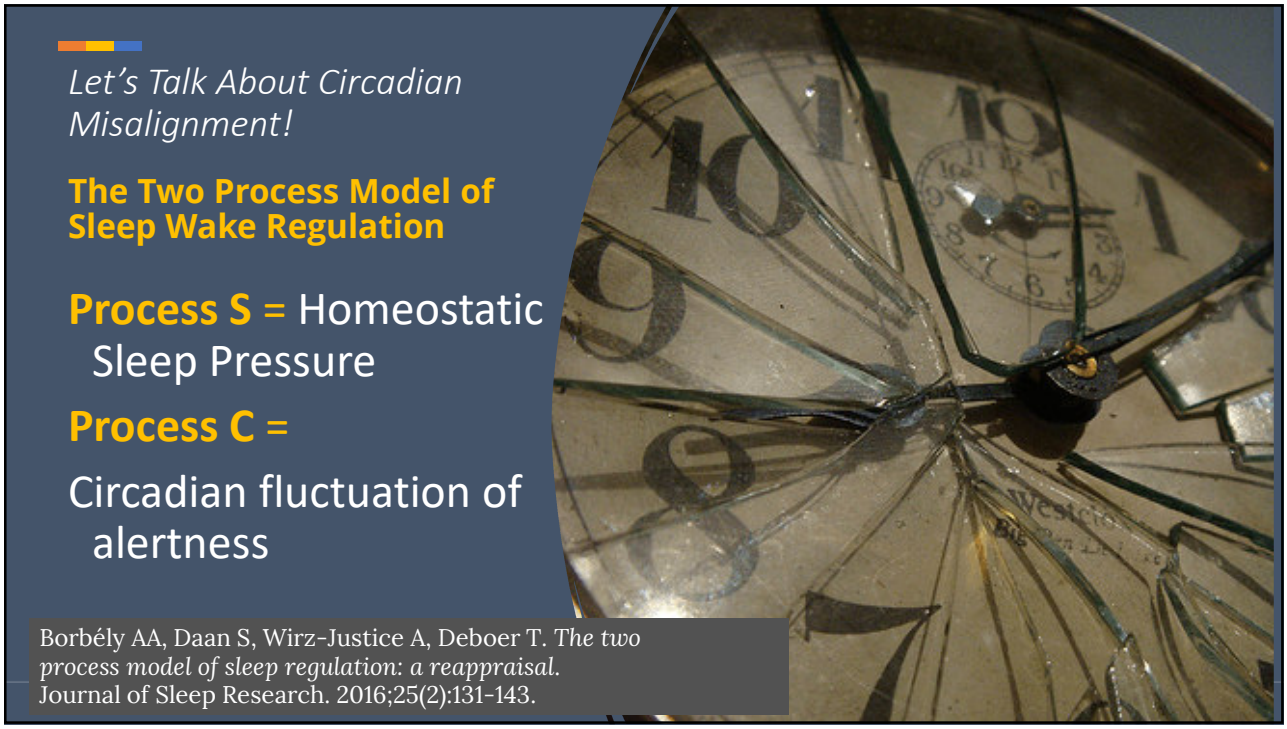
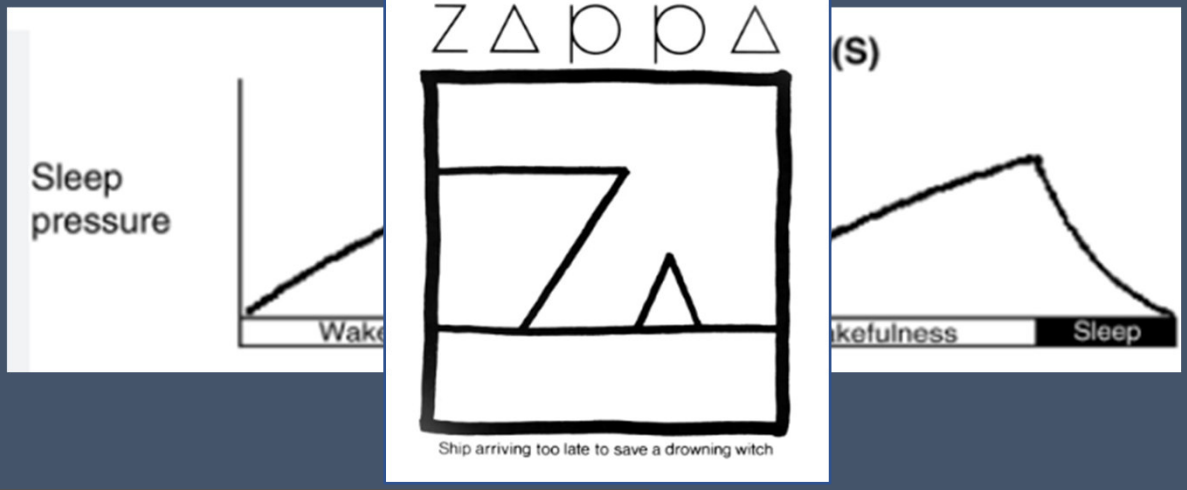

Let's Talk About Circadian Misalignment!
The Two Process Model of Sleep Wake Regulation
Process S = Homeostatic Sleep Pressure
Process C =
Circadian fluctuation of alertness
Borbély AA, Daan S, Wirz-Justice A, Deboer T. The two process model of sleep regulation: a reappraisal. Journal of Sleep Research. 2016;25(2):131-143.

22

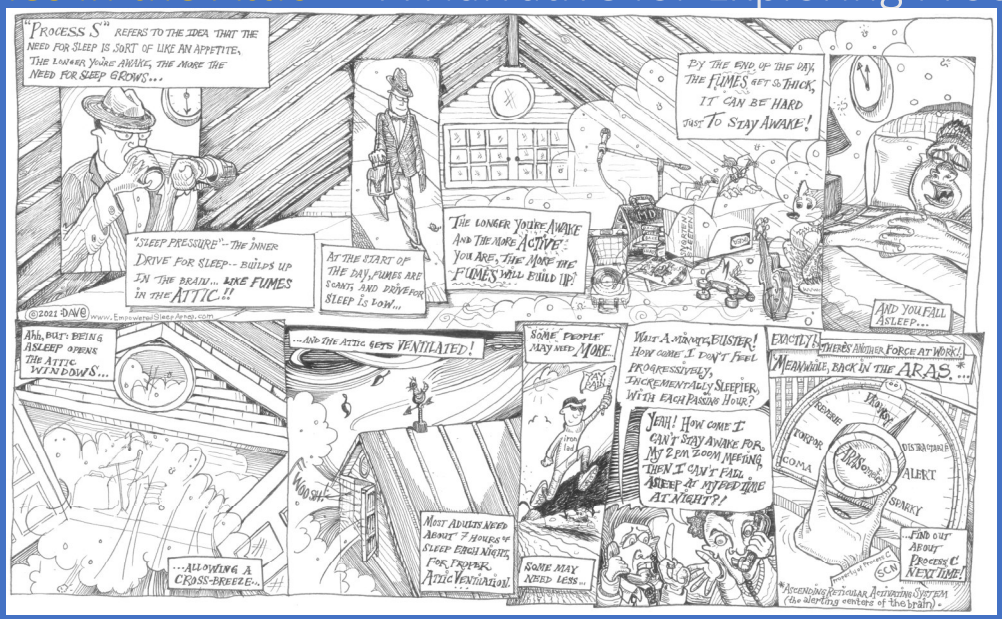
Process S: Homeostatic Drive For Sleep



Stiller JW, Postolache TT. Sleep-wake and Other Biological Rhythms: Functional Neuroanatomy. Clin Sports Med 24 (2005) 205-235

23

"Fumes in the Attic"—A Narrative for Exploring Process S



Cartoon: **McCarty DE:** "*Fumes in the Attic*" in: McCarty DE, Stothard E. *Empowered Sleep Apnea: A Handbook For Patients and the People Who Care About Them*. Bookbaby Press, 2022

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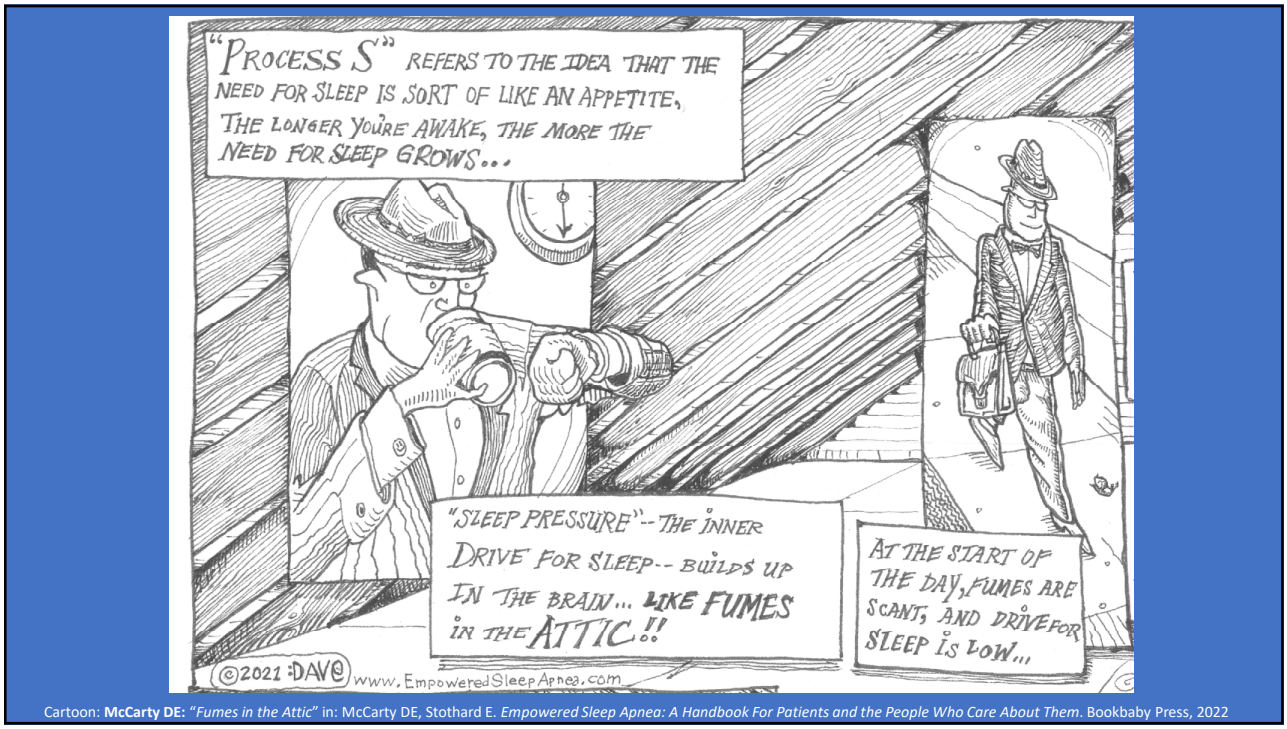

Cartoon: **McCarty DE:** "*Fumes in the Attic*" in: McCarty DE, Stothard E. *Empowered Sleep Apnea: A Handbook For Patients and the People Who Care About Them*. Bookbaby Press, 2022

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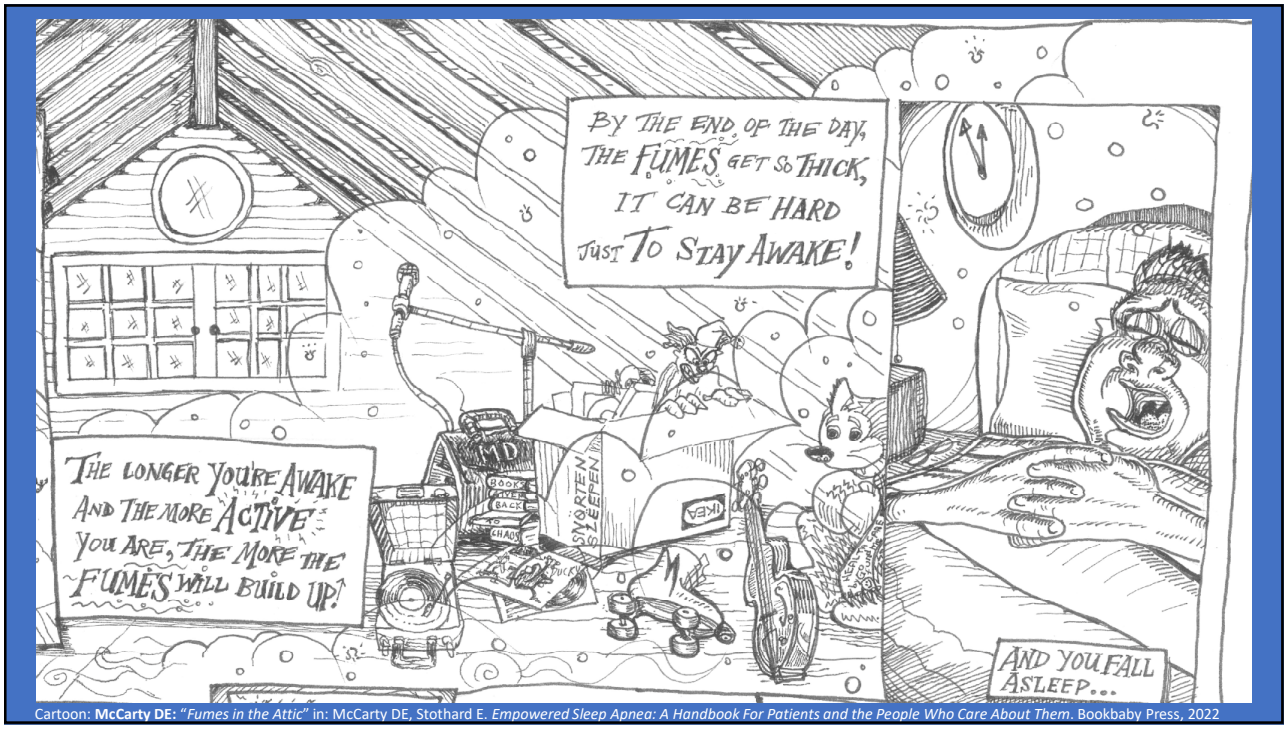

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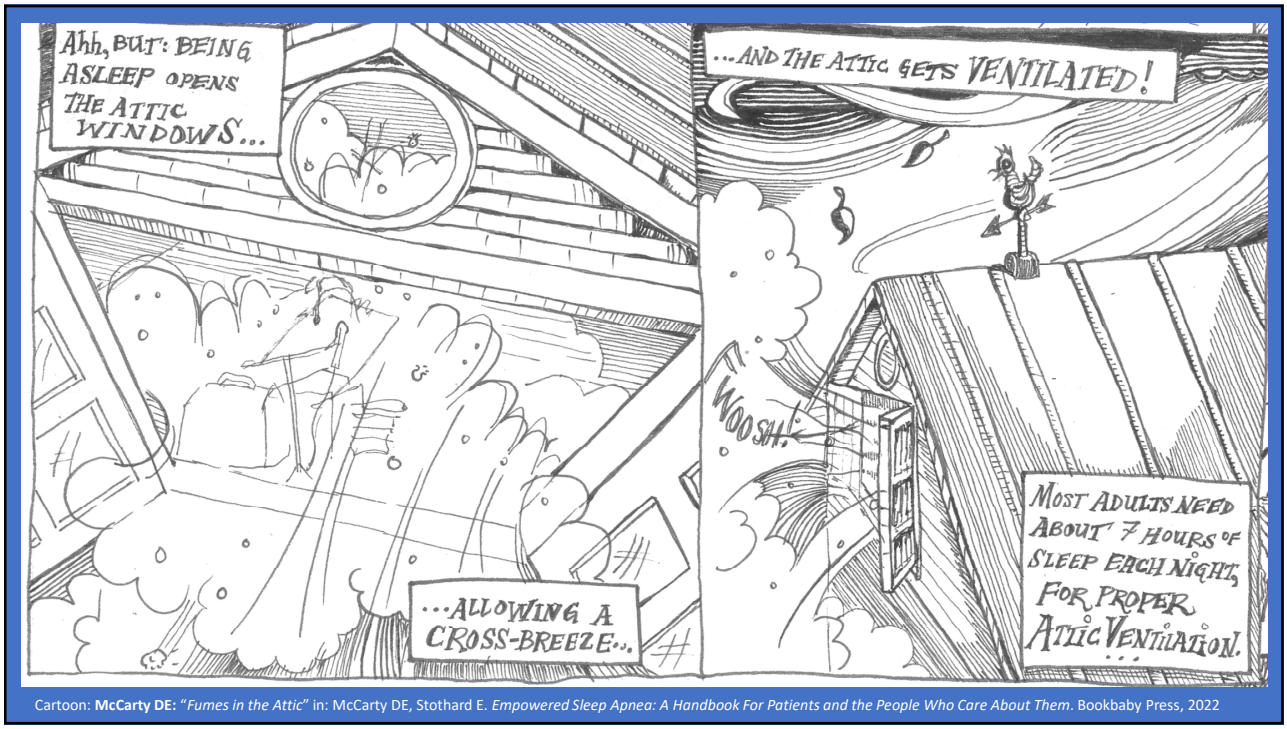

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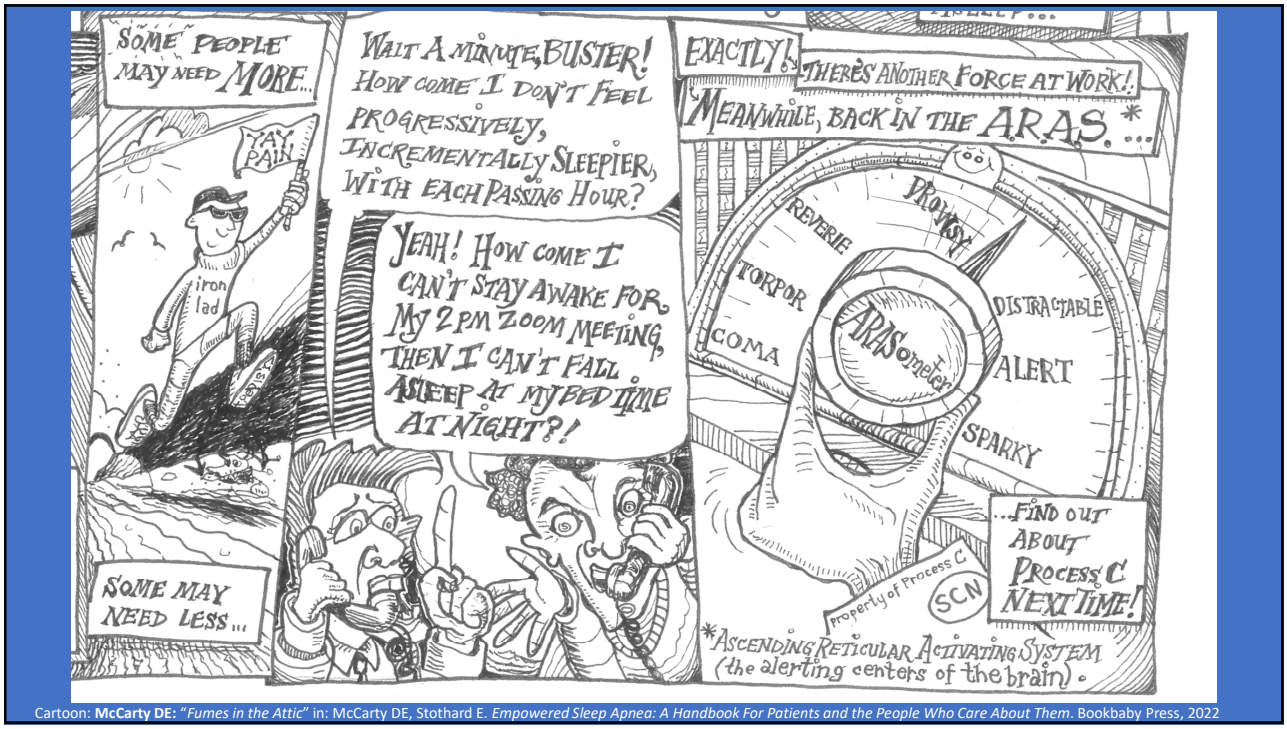

Cartoon: **McCarty DE:** "*Fumes in the Attic*" in: McCarty DE, Stothard E. *Empowered Sleep Apnea: A Handbook For Patients and the People Who Care About Them*. Bookbaby Press, 2022

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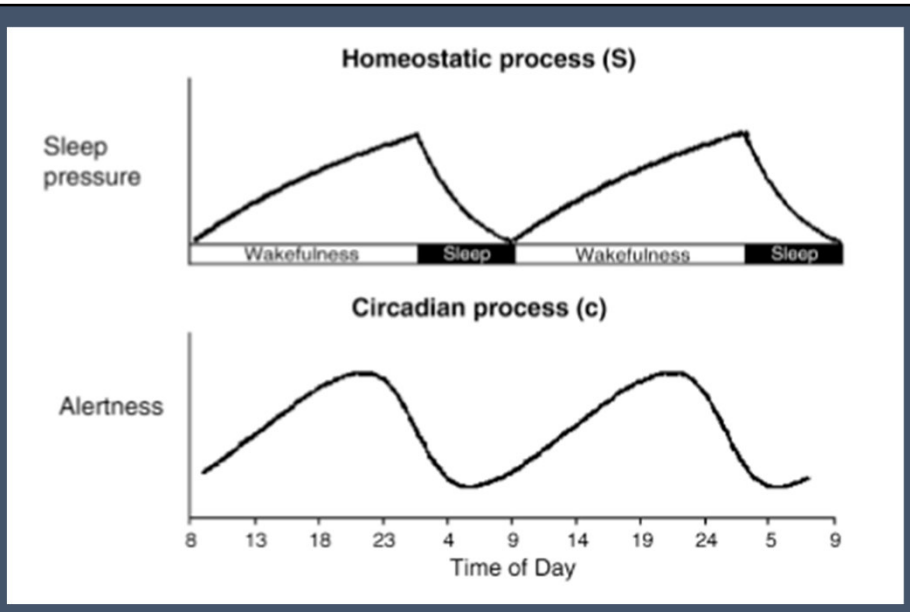
The interaction of Process S and Process C



From: Stiller JW, Postolache TT. Sleep-wake and Other Biological Rhythms: Functional Neuroanatomy. Clin Sports Med 24 (2005) 205-235, figure modified from Borbely AA. A Two Process Model of Sleep Regulation. Hum Neurobiol, 1982; 1(3):195-204

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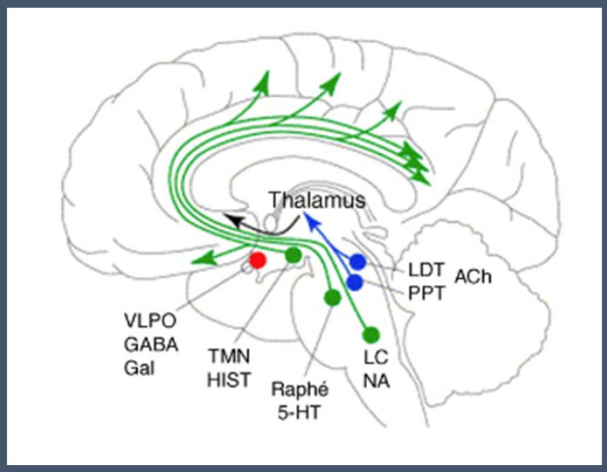
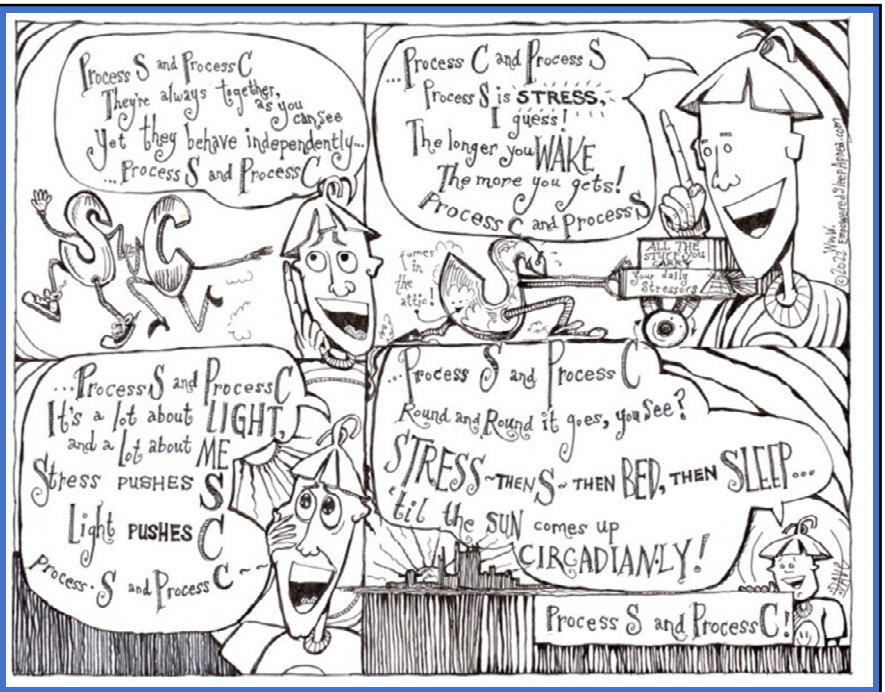
The Ascending Reticular Activating System (ARAS)



From: Stiller JW, Postolache TT. Sleep-wake and Other Biological Rhythms: Functional Neuroanatomy. Clin Sports Med 24 (2005) 205-235, figure modified from Saper CB et al. The sleep switch: hypothalamic control of sleep and wakefulness. Trends Neurosci 2001;24:726-31

30

"The Two Processes": A Cartoon Narrative that Explores the Two Process Model



Cartoon: **McCarty DE:** "*The Two Processes*" in: McCarty DE, Stothard E. *Empowered Sleep Apnea: A Handbook For Patients and the People Who Care About Them*. Bookbaby Press, 2022

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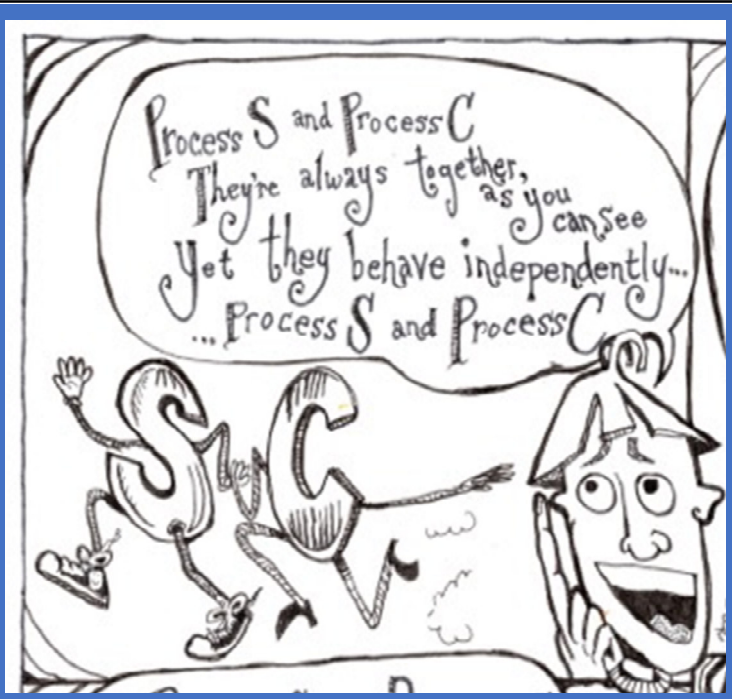

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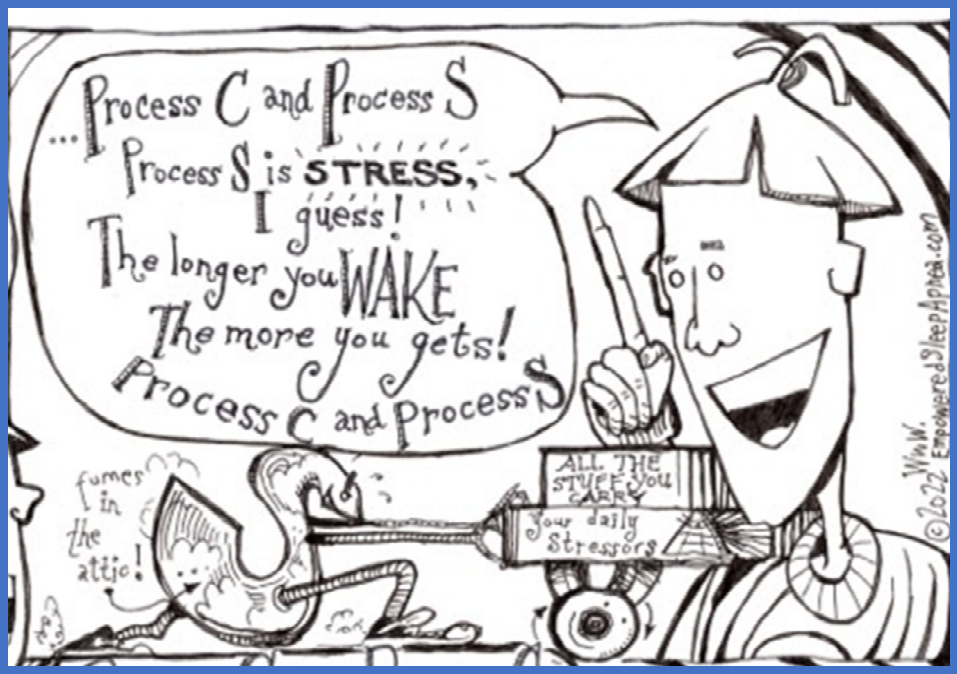

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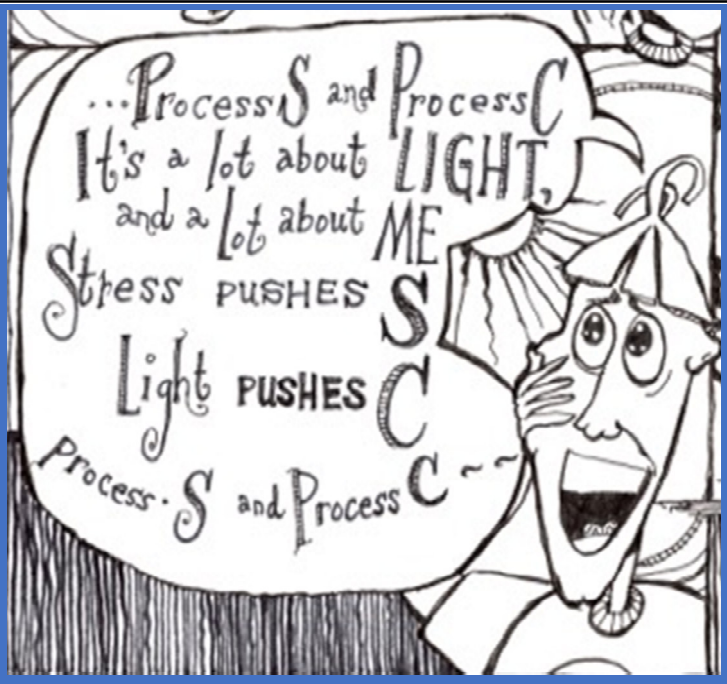

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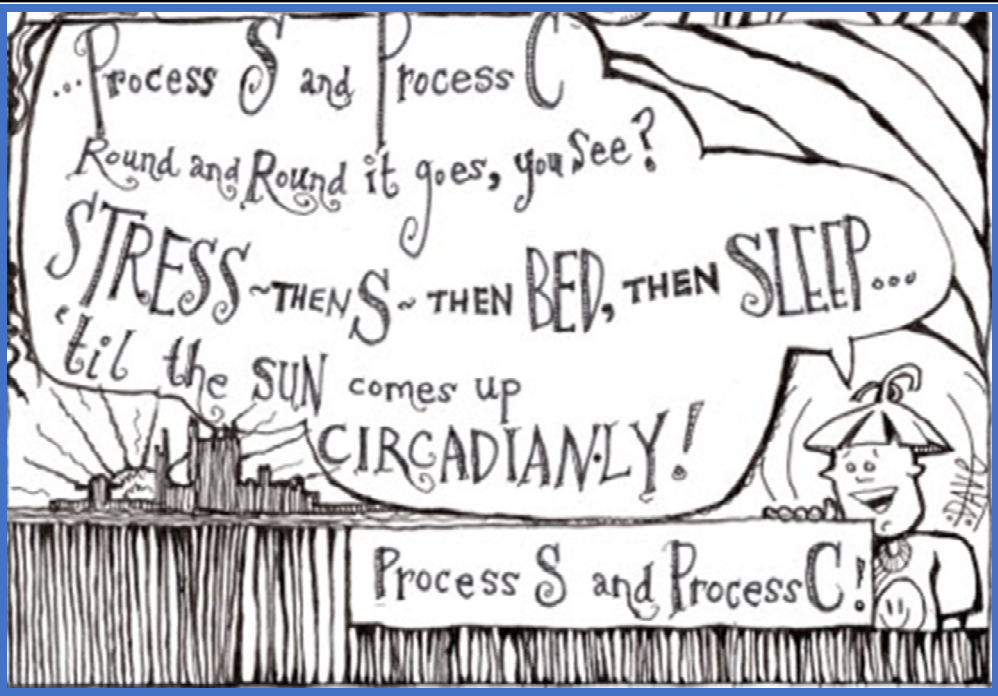

Cartoon: **McCarty DE:** "*The Two Processes*" in: McCarty DE, Stothard E. *Empowered Sleep Apnea: A Handbook For Patients and the People Who Care About Them*. Bookbaby Press, 2022

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Process C: **Five Things Clinicians and Patients Should Know**

- **Process C** is fluctuating "volume" of the ARAS
- **Circadian Sleep Phase**: Optimal Timing for Prolonged Sleep
- **Forbidden Zone**: hard to fall asleep before your bedtime
- **Dim Light Melatonin Onset**: Captain DLMO Prepares for the Landing in Sleepytown Airport
- **"Phase-Delaying Forces" at bedtime:** LIGHT!! (but also: excitement, socializing, eating, upright posture, increasing body temperature)

McCarty DE, Stothard E. *Empowered Sleep Apnea: A Handbook For Patients and the People Who Care About Them*. Bookbaby Press, 2022

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Get Yer Own!
www.empoweredsleepapnea.com/circadian-rhythmo-wheel

Circadian Rhythmo-Wheel: An interactive "TOY" for Exploring Process C

Process C is fluctuating "volume" of the ARAS

Circadian Sleep Phase: Optimal Timing for Prolonged Sleep

Forbidden Zone: hard to fall asleep before your bedtime

Dim Light Melatonin Onset: Captain DLMO Prepares for landing in *SleepyTown Airport*

"Phase-Delaying Forces" at bedtime: LIGHT!! (but also: excitement, socializing, eating, upright posture, increasing body temperature)

Cartoon: McCarty DE--"*Circadian Rhythmo-Wheel*" in: McCarty DE, Stothard E. *Empowered Sleep Apnea: A Handbook For Patients and the People Who Care About Them*. Bookbaby Press, 2022

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The Sleep Diary

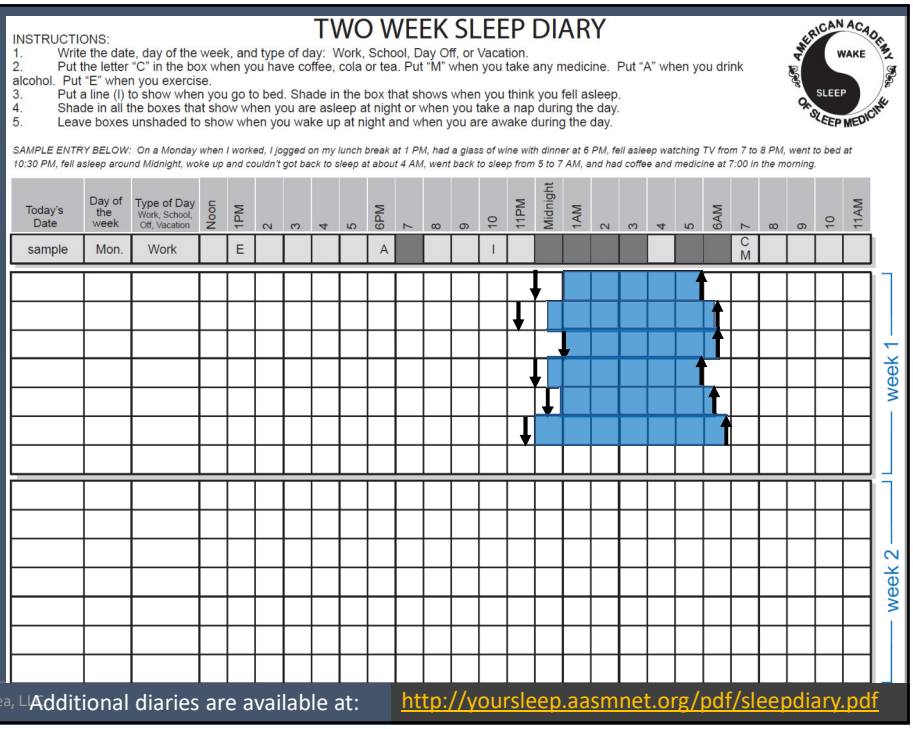
Complete the diary when you wake up in the morning, by recall (not in real-time).

Show where you GOT INTO BED with a *down arrow* ↓

Show where you GOT OUT OF BED with an *up arrow* ↑

Show where believe you were asleep by shading

After several days, a pattern will emerge…



Additional diaries are available at: http://yoursleep.aasmnet.org/pdf/sleepdiary.pdf

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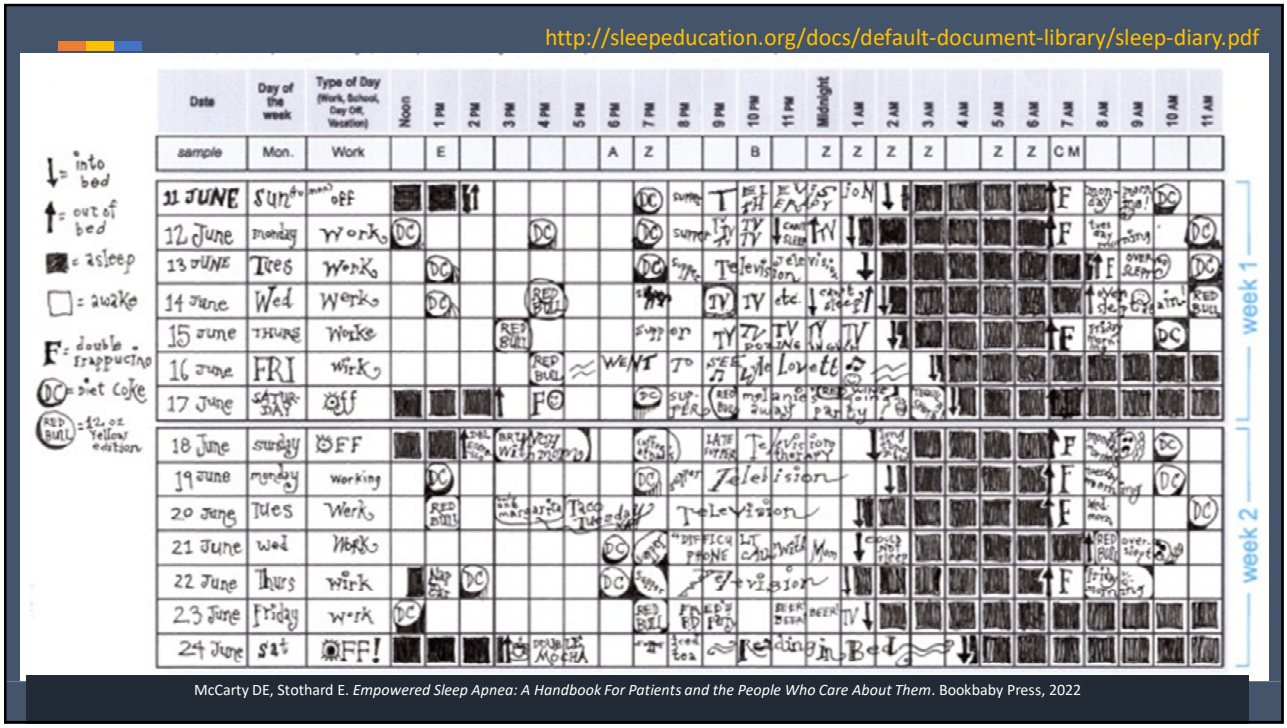
http://sleepeducation.org/docs/default-document-library/sleep-diary.pdf



McCarty DE, Stothard E. *Empowered Sleep Apnea: A Handbook For Patients and the People Who Care About Them*. Bookbaby Press, 2022

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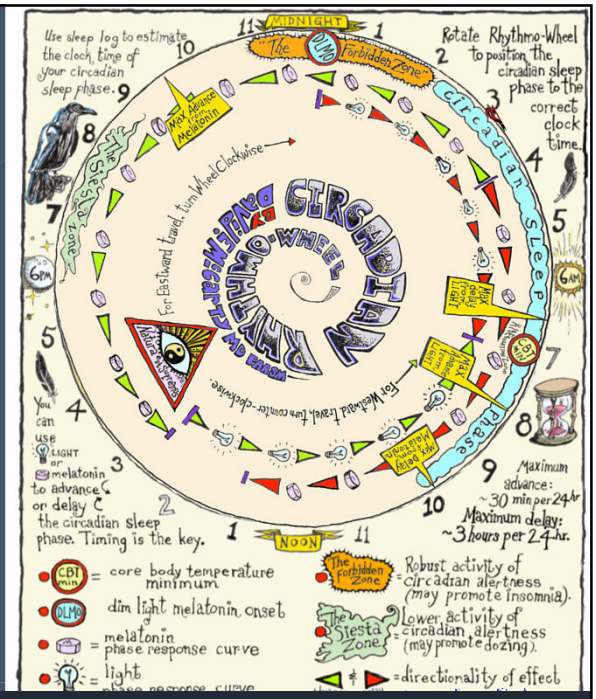
Delayed Sleep Phase Syndrome

- Phase-delaying forces at bedtime
- DLMO is suppressed by light
- Forbidden Zone is later, circadian sleep phase is later
- Patients complain of chronic "insomnia" and daytime neurobehavioral impairment symptoms



Cartoon: McCarty DE--"*Circadian Rhyhmo-Wheel*" in: McCarty DE, Stothard E. *Empowered Sleep Apnea: A Handbook For Patients and the People Who Care About Them*. Bookbaby Press, 2022

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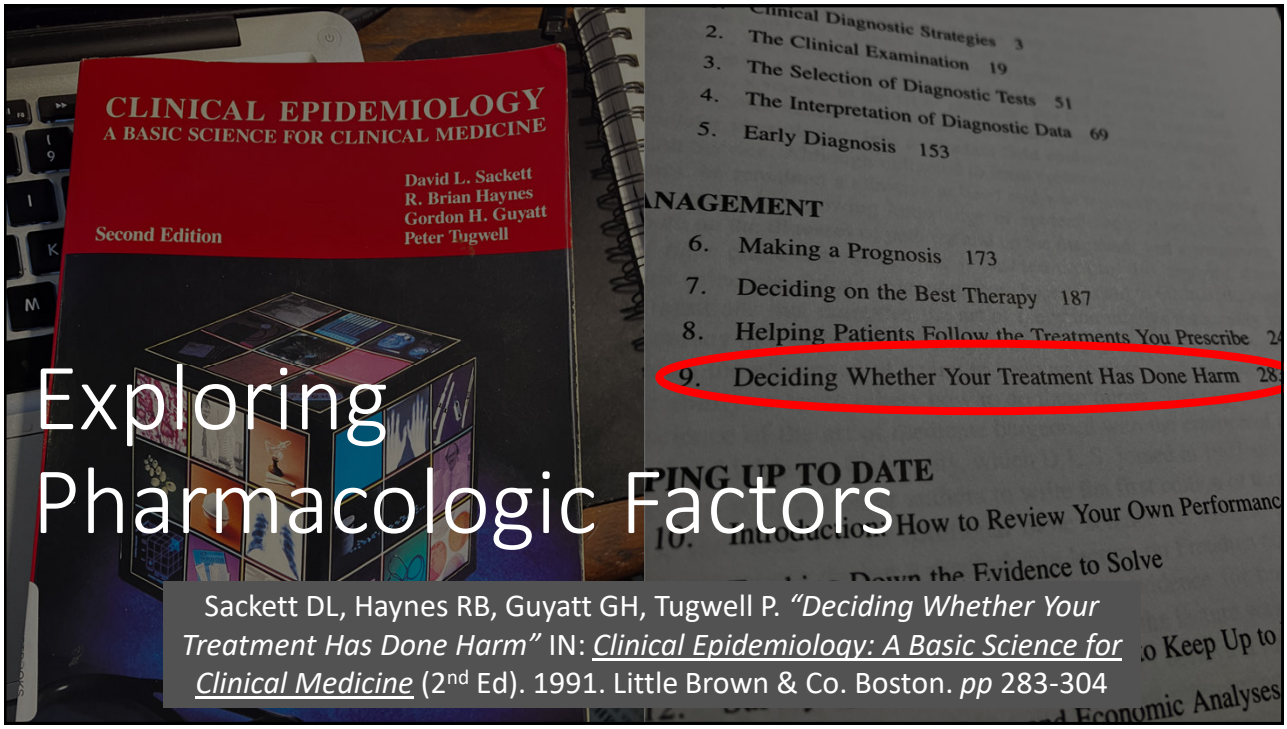

Exploring Pharmacologic Factors

Sackett DL, Haynes RB, Guyatt GH, Tugwell P. *"Deciding Whether Your Treatment Has Done Harm"* IN: *Clinical Epidemiology: A Basic Science for Clinical Medicine* (2nd Ed). 1991. Little Brown & Co. Boston. *pp* 283-304

41

Rules of Evidence for Causation

- Is the association consistent from study to study?
- Is the temporal sequence of exposure and outcome in the right direction?
- Is there a dose-response gradient?
- Does the association make sense?

Sackett DL, Haynes RB, Guyatt GH, Tugwell P. *"Deciding Whether Your Treatment Has Done Harm"* IN: *Clinical Epidemiology: A Basic Science for Clinical Medicine* (2nd Ed). 1991. Little Brown & Co. Boston. *pp* 283-304

42

The Story of How The Five Finger Approach Changed Wendy's Life

McCarty, DE. Sometimes, You're the One. OR: The Story About How The Five Finger Approach Found a Problem That Had Never Been Described and How it Changed Wendy's Life. *In: Dave's Notes (official Blog of Empowered Sleep Apnea)* Published online 11/18/22

Also in:
Empowered Sleep Apnea: THE PODCAST
Season Two: STORIES FROM THE FIELD
Episode 4: SHREVEPORT

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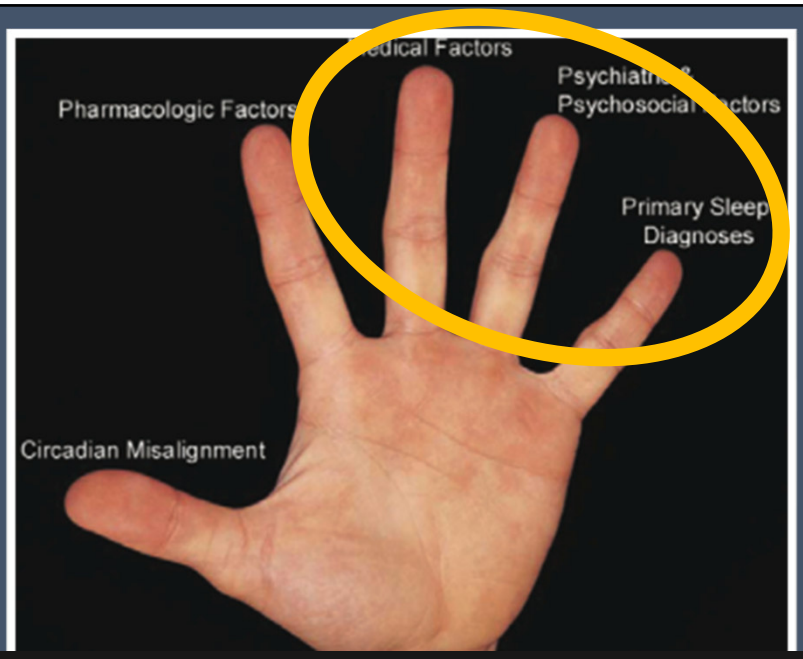
The other three fingers…



McCarty DE. *Beyond Ockham's Razor: Redefining Problem-Solving in Clinical Sleep Medicine Using a "Five-Finger" Approach*. Journal of Clinical Sleep Medicine. 2010;6(3):292-296

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Exploring the NARRATIVE using the Five Finger Approach!

- **Medical factors:** explore timing of complaints and patient's perception of problem relevant to medical issues. Examples include disruption of sleep by pain, shortness of breath, nocturia, headaches, GERD
- **Psychosocial/Psychiatric factors:** ask about the sleeping environment, exposure to technology before bed/in bed, probe for anxiety and depression, prior psychiatric diagnoses

Primary Sleep Disorders: Explore for disorders mapping to the ICSD-3-TR

"Sleep Apnea" -- Ask about snoring, witnessed apneas, waking with gasping, teeth clenching/grinding, morning headaches, daytime sleepiness

RLS: restless legs sensations, frequent movements of legs during sleeping timeframe, nonvolitional leg jerks

Parasomnias: unusual behaviors during the sleeping timeframe (sleepwalking, dream enactment behaviors)

Narcolepsy: uncontrollable daytime sleep attacks, cataplexy, sleep paralysis, sleep-related hallucinations

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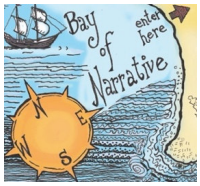

NARRATIVE

- Claudio Mahoney is a 43-year-old man with 4/10 sleep-wake satisfaction BECAUSE…
  - Difficulty getting to sleep, with the perception that it takes a long long time to get to sleep most nights
  - Difficulty maintaining sleep, with the sense that he has light stage sleep and has frequent brief awakenings
  - Curtailed total sleep time during the work week, due to the requirement to get up for work
  - A sense of feeling poorly refreshed upon awakening most days, with functionally limiting afternoon drowsiness

McCarty DE. Beyond Ockham's razor: redefining problem-solving in clinical sleep medicine using a "five-finger" approach. J Clin Sleep Med. 2010 Jun 15;6(3):292-6.

Cartoon from: McCarty DE *Your Luxurious Destination.* In: McCarty DE & Stothard E. Empowered Sleep Apnea: A Handbook for Patients and the People Who Care About Them. BookBaby Press, NJ. 2022.

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Summing Up

- **INSOMNIA**: A "**disorder**", not a "**disease**"…a **PUZZLE**, not just a "**symptom**"
- Common disorder, and more common in women, lower socioeconomic status, advancing age
- **Insomnia with short sleep time**: association with increased risk for hypertension, diabetes, depression, anxiety, increased mortality
- The **Challenge of COMISA**: recognition is not enough!
- Beyond the label! An introduction to **NARRATIVE BASED MEDICINE!!**
- Exploration of the **NARRATIVE** using the *Five Finger Approach*
  - Approaching **Circadian Misalignment** using the **Two-Process Model of Sleep-Wake Regulation** (**Process S** and **Process C**)
    - "***Fumes in the Attic***"—Process S
    - "***Circadian Rhythmo-Wheel***"—Process C
  - An approach to **Pharmacologic Factors** using an *Evidence-Based-Medicine* approach (Sackett *et al*)
  - An overview of the OTHER THREE FINGERS: **Medical Factors**, **Psychiatric/Psychosocial Factors**, and **Primary Sleep Diagnoses**

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Further Enrichment

American Geriatrics Society 2019 Updated AGS Beers Criteria for Potentially Inappropriate Medication Use in Older Adults. J Am Geriatr Soc 00:1-21 (2019)

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McCarty, DE. *Sometimes, You're the One. OR: The Story About How The Five Finger Approach Found a Problem That Had Never Been Described and How it Changed Wendy's Life. In: Dave's Notes (official Blog of Empowered Sleep Apnea)* Published online 11/18/22

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Vgontzas AN, Liao D, Pejovic S, Calhoun S, Karataraki M, Basta M, Fernández-Mendoza J, Bixler EO. *Insomnia with short sleep duration and mortality: the Penn State cohort.* Sleep. 2010 Sep;33(9):1159-64.

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End

Cartoon: McCarty DE: *The New Patient.* in: McCarty DE & Stothard E. *Empowered Sleep Apnea: A Handbook for Patients and the People Who Care About Them.* BookBaby Press, NJ. 2022

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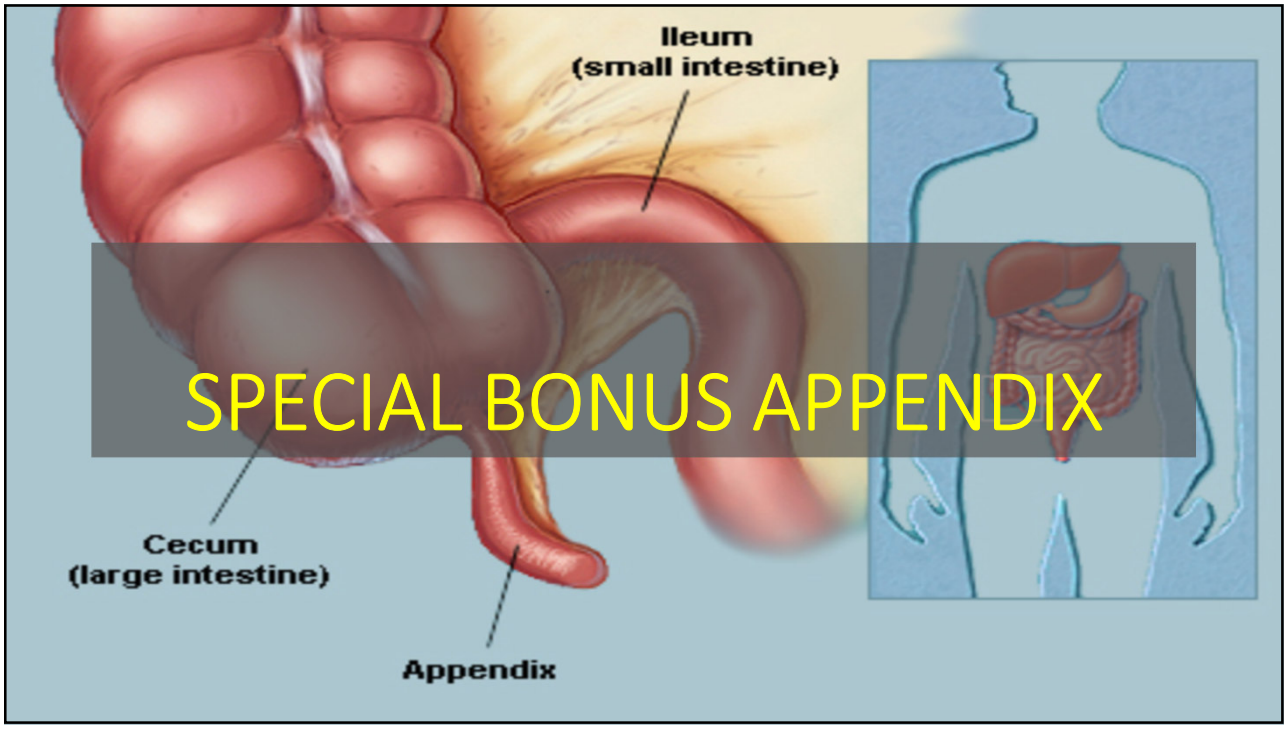

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INDEX FINGER DEEP DIVE

A fly-by of common meds and substances and what they do to the sleep-wake experience

McCarty DE. *Beyond Ockham's Razor: Redefining Problem-Solving in Clinical Sleep Medicine Using a "Five-Finger" Approach*. Journal of Clinical Sleep Medicine. 2010;6(3):292-296

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Selected Drugs Affecting Sleep and Wake

Cardiovascular Drugs

- Beta Blockers
- ACE inhibitors
- Statins

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Selected Drugs Affecting Sleep and Wake

Cardiovascular Drugs

- Beta Blockers
- ACE inhibitors
- Statins

Metoprolol (Toprol XL), Labetalol

Beta blockers promote insomnia and can disturb dreams. Disturbances in REM sleep can lead to nightmares or even to to the disquieting experience of dreaming whilst seemingly awake (hallucinations). Lipophilic beta blockers cross the blood-brain barrier more readily and are more likely to provoke sleep disturbances.

Note that beta blockers can also contribute to daytime WAKE-related symptoms of generalized lethargy and fatigue.

McCarty DE. *Beyond Ockham's Razor: Redefining Problem-Solving in Clinical Sleep Medicine Using a "Five-Finger" Approach*. Journal of Clinical Sleep Medicine. 2010;6(3):292-296

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Selected Drugs Affecting Sleep and Wake

Cardiovascular Drugs

- Beta Blockers
- ACE inhibitors
- Statins

Lisinopril, Ramipril

This drug class can increase airway irritability, leading to disruptive coughing that can disturb sleep. The upper airway irritability may worsen obstructive sleep apnea pathology.

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Selected Drugs Affecting Sleep and Wake

Cardiovascular Drugs

- Beta Blockers
- ACE inhibitors
- Statins

Atorvastatin, Rosuvastatin, Simvastatin

Statins may provoke insomnia with or without causing muscle pain. If you get muscle pain with statins, this can also interfere with sleep.

Note that statin-induced muscle pain can also color the lens by which WAKE is viewed, leading to fatigue & poor exercise tolerance.

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Selected Drugs Affecting Sleep and Wake

Mental Health Drugs

- Selective serotonin reuptake inhibitors (SSRIs)
- Serotonin and Norepinephrine Reuptake Inhibitors
- Norepinephrine and Dopamine Reuptake Inhibitors
- Tricyclic antidepressants
- CNS Stimulants

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Selected Drugs Affecting Sleep and Wake

Mental Health Drugs

- Selective serotonin reuptake inhibitors (SSRIs)
- Serotonin and Norepinephrine Reuptake Inhibitors
- Norepinephrine and Dopamine Reuptake Inhibitors
- Tricyclic antidepressants
- CNS Stimulants

Fluoxetine, paroxetine, sertraline

SSRIs contribute to “restless legs” symptoms (higher doses = worse effects).

SSRIs can also increase the likelihood of dream enactment behavior, which is another way of saying “moving around whilst you dream.” When dream enactment behavior happens for no good reason, it’s called REM Sleep Behavior disorder.

SSRIs can cause insomnia as an adverse effect (fluoxetine is famous for this). Alternatively, SSRIs can also cause WAKE-related symptoms of grogginess or sedation (paroxetine is famous for this).

McCarty DE. *Beyond Ockham's Razor: Redefining Problem-Solving in Clinical Sleep Medicine Using a "Five-Finger" Approach*. Journal of Clinical Sleep Medicine. 2010;6(3):292-296

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Selected Drugs Affecting Sleep and Wake

Mental Health Drugs

- Selective serotonin reuptake inhibitors (SSRIs)
- Serotonin and Norepinephrine Reuptake Inhibitors
- Norepinephrine and Dopamine Reuptake Inhibitors
- Tricyclic antidepressants
- CNS Stimulants

Venlafaxine, desvenlafaxine

All of the above that we just mentioned about SSRIs is true for this drug class. The Norepinephrine reuptake inhibition is particularly provocative for insomnia, restless legs symptoms, and dream enactment behavior.

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Selected Drugs Affecting Sleep and Wake

Mental Health Drugs

- Selective serotonin reuptake inhibitors (SSRIs)
- Serotonin and Norepinephrine Reuptake Inhibitors
- Norepinephrine and Dopamine Reuptake Inhibitors
- Tricyclic antidepressants
- CNS Stimulants

Bupropion

Think of this drug class as being an amplifier for the ARAS, and you'll then understand why insomnia is one of the most common adverse sleep-related effects.

Bupropion is the only antidepressant that doesn't provoke restless legs.

McCarty DE. ***Beyond Ockham's Razor: Redefining Problem-Solving in Clinical Sleep Medicine Using a "Five-Finger" Approach***. Journal of Clinical Sleep Medicine. 2010;6(3):292-296

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Selected Drugs Affecting Sleep and Wake

Mental Health Drugs

- Selective serotonin reuptake inhibitors (SSRIs)
- Serotonin and Norepinephrine Reuptake Inhibitors
- Norepinephrine and Dopamine Reuptake Inhibitors
- Tricyclic antidepressants
- CNS Stimulants

Amitriptyline, imipramine, protriptyline

All tricyclics can provoke restless legs symptoms and signs (like periodic limb movements of sleep). They also can be sedating, and in seniors, they can cause difficulty with memory, due to an anticholinergic side effect profile.

McCarty DE. *Beyond Ockham's Razor: Redefining Problem-Solving in Clinical Sleep Medicine Using a "Five-Finger" Approach*. Journal of Clinical Sleep Medicine. 2010;6(3):292-296

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Selected Drugs Affecting Sleep and Wake

Mental Health Drugs

- Selective serotonin reuptake inhibitors (SSRIs)
- Serotonin and Norepinephrine Reuptake Inhibitors
- Norepinephrine and Dopamine Reuptake Inhibitors
- Tricyclic antidepressants
- CNS Stimulants

Methylphenidate (Ritalin), amphetamine/ dextroamphetamine (Adderall)

Stimulants are famous for causing sleep-onset insomnia. The longer-lasting the formulation, and the later it is taken in the day, the more likely it will be to interfere with transitioning to sleep.

McCarty DE. *Beyond Ockham's Razor: Redefining Problem-Solving in Clinical Sleep Medicine Using a "Five-Finger" Approach*. Journal of Clinical Sleep Medicine. 2010;6(3):292-296

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Selected Drugs Affecting Sleep and Wake

Pulmonary / Rheumatology Drugs

- Beta-2 Agonists
- Corticosteroids

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Selected Drugs Affecting Sleep and Wake

Pulmonary / Rheumatology Drugs

Beta-2 Agonists

Corticosteroids

Albuterol, salmeterol

These inhalers tend to rev you up! Expect an increase to your pulse, and difficulty with getting to sleep, lasting for as long as the drug is active.

McCarty DE. *Beyond Ockham's Razor: Redefining Problem-Solving in Clinical Sleep Medicine Using a "Five-Finger" Approach*. Journal of Clinical Sleep Medicine. 2010;6(3):292-296

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Selected Drugs Affecting Sleep and Wake

Pulmonary / Rheumatology Drugs

Beta-2 Agonists

Corticosteroids

Prednisone, methylprednisolone

Corticosteroids can really jack with your sleep. Difficulty getting to sleep, waking up too early, and abnormal dreams have all been described.

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Selected Drugs Affecting Sleep and Wake

Anticonvulsant Drugs

Gabapentinoids

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Selected Drugs Affecting Sleep and Wake

Anticonvulsant Drugs

Gabapentinoids

Gabapentin, Pregabalin

Drugs in this class are technically "anticonvulsants" but they're mostly prescribed for reasons other than seizures. They are often used to manage chronic pain, headache syndromes, fibromyalgia, and symptoms of WED. They are sedating, in general, and can be considered "hypnotics" (sleeping pills).

Of importance, these drugs can contribute to next-day sedation when dosed at bedtime!

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Selected Drugs Affecting Sleep and Wake

Social Drugs

- Nicotine
- Alcohol
- Cannabis (THC)
- Caffeine

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Selected Drugs Affecting Sleep and Wake

Social Drugs

- Nicotine
- Alcohol
- Cannabis (THC)
- Caffeine

Nicotine is not friendly to sleep, if used regularly. Pharmacologically, nicotine is a CNS stimulant, so it will interfere with sleep while the drug is active. The other side of the coin with nicotine is the physical and psychological discomfort that comes from withdrawal, which generally begins about an hour after the last dose, for heavy users. That sensation is also a potent stimulus for insomnia. Old-school smoking is particularly irritative to the upper airway and is likely to worsen obstructive pathology.

McCarty DE. *Beyond Ockham's Razor: Redefining Problem-Solving in Clinical Sleep Medicine Using a "Five-Finger" Approach*. Journal of Clinical Sleep Medicine. 2010;6(3):292-296

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Selected Drugs Affecting Sleep and Wake

Social Drugs

- Nicotine
- Alcohol
- Cannabis (THC)
- Caffeine

Alcohol worsens the propensity for Sleep Apnea, particularly obstructive pathology. Though it may help you fall asleep faster, sleep worsens as your blood alcohol content drops, and second-half-of-night sleep is generally rocky and poor-quality. Alcohol hangover symptoms can confound interpretation of daytime neurobehavioral impairment.

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Selected Drugs Affecting Sleep and Wake

Social Drugs

- Nicotine
- Alcohol
- Cannabis (THC)
- Caffeine

THC is the psychoactive component of marijuana. Depending on the strain, it may be activating or sedating. THC users may experience withdrawal symptoms of anxiety and insomnia, which can lead to a self-perpetuating problem.

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Selected Drugs Affecting Sleep and Wake

Social Drugs

- Nicotine
- Alcohol
- Cannabis (THC)
- Caffeine

Caffeine can interfere with sleep for as long as the drug is in the system. Caffeine can mask daytime impairment symptoms, leading to a sudden "crash" in energy when the drug is metabolized away.

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An Empowered Overview of Cognitive Behavioral Therapy for Insomnia (CBTi)

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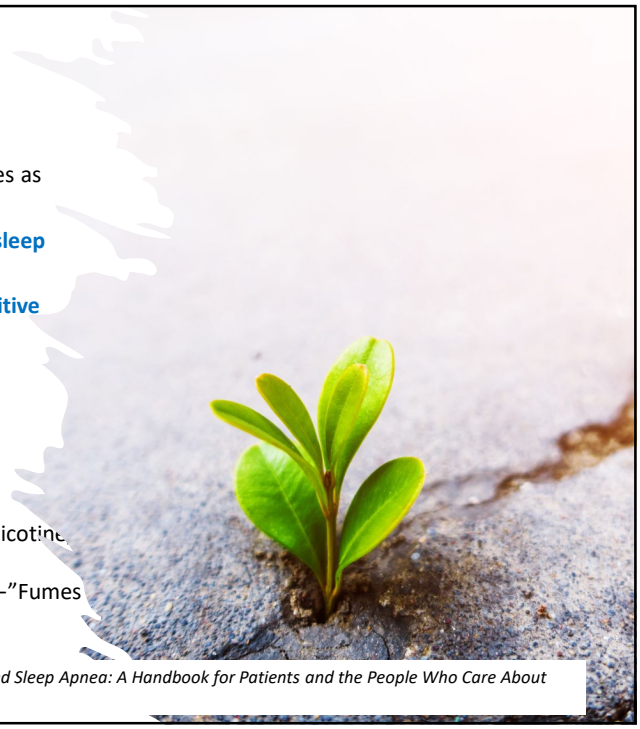
CBT for insomnia: core concepts

- Eliminate stimuli to ARAS, and avoid phase delaying influences as bedtime nears (**proactive wind-down time**)
- Limit the amount of time in bed to enhance sleep pressure (**sleep restriction therapy**)
- De-recruit the ARAS to protect the sleeping timeframe (**cognitive restructuring, paradoxical intention, guided distraction**)
- Eliminate "habit" of being awake in bed, decrease Pavlovian conditioning, uncouple sleep-related stimuli with behavioral wakefulness (**stimulus control**)
- Stabilize **Process C** (stable rise time with bright light)
- Not included under the rubric of "CBTi", but still important:
  - inventory and eliminate social insomniagens: caffeine, nicotine, THC, alcohol
  - Engage in daily moderate exercise (increases **Process S**—"Fumes the Attic")



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Proactive wind-down time

- "Wind-Down" place is someplace other than your bed
- Starts 60 minutes before "lights out"
- Task lighting, relaxing mood,
- Reading materials: selected to de-recruit the ARAS
- No electronics
- No working
- "Scheduled Worry Time" journaling is allowed
- Semi recumbent positioning (eg: easy-chair position)

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Sleep Restriction Therapy

- Decide on a time you'll get up (same time every day)
- Count back 6 hours: this is your new "lights out" time
- Count back one more hour: this is when your wind-down time begins
- After **proactive wind-down**, get in your bed, and lights go out
  - Bed is ONLY for sleep and relations: nothing else happens there!
- **Paradoxical intention**: don't TRY to fall asleep, let sleep come to you

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Sleep Restriction Therapy

- Get out of the bed at your scheduled rise time, even if you slept poorly (fixed rise time)
- Fill out Sleep Log upon awakening to chart your progress
- When you are "successfully" sleeping through the restricted interval, you may back up (make earlier) your bedtime by 15-30 minutes per day, until you are sleeping 7-8 h per night
- *No napping during sleep restriction therapy*

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Cognitive Strategies

- **Guided distraction:** make sure it doesn't stimulate the ARAS
  - Music therapy
  - Brown/Pink/White Noise generators
- **Cognitive restructuring** of nocturnal awakenings
  - Self-talk is critical difference between "pain" and "suffering"

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Stimulus Control Therapy: "Breaking the Habit of Insomnia"

- *"You become the behavior you rehearse"*
- Use "FUMES in the ATTIC" to help you unlearn the habit of insomnia
- If you are awake in bed for more than 15 minutes, quietly remove yourself from the bed and go back to Wind Down place
  - Self-talk is gentle: "going to get some more attic fumes!"
  - "If I sleep less tonight, I'll have more "attic fumes" tomorrow!"
- Set a timer for 30 minutes, and re-engage in **wind-down**-approved activity
- When timer goes off, go back to bed and let sleep come to you (paradoxical intention, guided distraction)
- **COMMON**: You may"ping pong" back and forth between **bed** and wind down for the first few nights: *be patient. Let your sleep pressure come to you.*

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Sleep Restriction Therapy: Precautionary statements

- **Sleep restriction therapy** is designed to make you sleepy, by increasing **Process S** (homeostatic sleep pressure—"attic fumes"). Use judgment regarding deploying this approach. While you are in the beginning stages of sleep deprivation, you may be riskier with tasks like driving, for example
- Some mental health conditions (e.g.: depression, bipolar disorder, anxiety) worsen in the presence of sleep restriction. For patients with mental health problems that become worse with sleep deprivation, it is recommended these exercises happen while under the supervision of a qualified mental health provider
- These exercises are most effective at restoring one's ability to sleep naturally if they're done without medication

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Recap: Two Process Model and CBTi

- "**Process S**" = internal "sleep pressure" or drive for sleep ("Attic Fumes").
- "**Process C**" = timing of the ebb and flow of the alerting centers in the brain (Circadian Rhythmo-Wheel)
- **Proactive Wind Down Time**: De-recruits the ARAS, Stabilizes Process C
- **Sleep Restriction Therapy**: Enhances sleep pressure
- **Paradoxical intention and Guided Distraction**: De-recruits the ARAS
- **Cognitive restructuring of nocturnal awakenings**: De-recruits the ARAS
- **Stimulus Control Therapy**: Breaks the "habit" of insomnia
- **Fixed Rise Time with Bright Light**: Stabilizes Process C
- Use caution with high-risk activities like driving, and undertake these exercises with supervision of mental health provider, if you have pre-existing mental health problems

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Hypnotic Pharmacotherapy

An overview of Common Meds

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Considerations when Prescribing Hypnotic Agents

- Is the **risk-benefit ratio** of using the medication justified?
  - What is the risk of the drug?
  - What is the risk of untreated insomnia?
  - Have non-pharmacologic options been explored?
  - Does the patient have a concomitant sleep disorder that requires a non-hypnotic treatment plan?
- If pharmacotherapy is pursued, how can the risk of the intervention be minimized?
  - Use non-habituating medications, when possible
  - Discuss potential for harm
  - "Start low, go slow"
  - Emphasize importance of behavioral strategies
  - Re-assess requirement for medication regularly, to re-evaluate the risk-benefit ratio

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Potential risks of hypnotic pharmacotherapy

- Habituation and requirement for dose escalation: benzodiazepines, tolerance to sedation may occur with antihistamines
- Nocturnal injuries from unsteadiness: all drug classes. Exceptions: doxepin, melatonin
- Nocturnal injuries from complex behaviors (sleepwalking): benzodiazepine receptor agonists (especially zolpidem)
- Daytime neurobehavioral impairment: potentially all drug classes. Anticholinergic agents and antipsychotics may worsen delerium
- Dementia: association with long term use (all drug classes)
- Anticholinergic effects--constipation, urinary retention, orthostasis, cognitive impairment: antihistamines, antidepressants (exception: doxepin)

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Potential risks of untreated insomnia

- Neurobehavioral impairment from sleep curtailment
  - Absenteeism, work deficit
  - Relationship stress
  - Risk for errors on the job
  - Risk for accidents
- Worsening mental health and risk for suicide
- Insomnia with short sleep phenotype: increased risk for hypertension, diabetes, substance abuse, depression, anxiety

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The Beers List

- American Geriatrics Society: Evidence-based compilation of medications which, in general, pose a potential threat to seniors (age>65)
- Bottom line with respect to hypnotic agents: **all hypnotic agents should be considered "high risk" drugs in seniors**
  - Exceptions: low dose doxepin (3-6mg), melatonin agonists
- Emphasizes importance of behavioral strategies and independent management of relevant disorders (such as sleep apnea)

https://www.guidelinecentral.com/summaries/american-geriatrics-society-2015-updated-beers-criteria-for-potentially-inappropriate-medication-use-in-older-adults/#section-date

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The Beers List and Hypnotics

Drug Class	Common medictions	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Antihistamines	Diphenhydramine, hydroxyzine	Anticholinergic, clearance reduced with advanced age	Avoid	Moderate	Strong
Antidepressants	Amitriptyline, clomipramine, desipramine, imipramine, nortryptiline, mirtazepine, doxepin (>6mg)	Highly anticholinergic, causes orthostasis. Mirtazepine may cause hyponatremia	Avoid (exception is doxepin 3-6mg); with mirtazepine, use low dose and follow sodium	High	Strong
Benzodiazepines	Alprazolam, lorazepam, temazepam, clonazepam, diazepam	Cognitive impairment, delerium, falls, accidents	Avoid (may be appropriate for severe anxiety, RBD)	Moderate	Strong

https://www.guidelinecentral.com/summaries/american-geriatrics-society-2015-updated-beers-criteria-for-potentially-inappropriate-medication-use-in-older-adults/#section-date

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The Beers List and Hypnotics

Drug Class	Common medictions	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Benzodiazepine receptor agonists	Eszopiclone, zolpidem, zaleplon	Delerium, falls, fractures, increased ED visits, accidents	Avoid	Moderate	Strong
Antipsychotics	Quetiapine	Increased risk of CVA and cognitive decline in persons with dementia	Avoid in persons with behavioral problems of dementia, if possible	Moderate	Strong
Benzodiazepines	Alprazolam, lorazepam, temazepam, clonazepam, diazepam	Cognitive impairment, delerium, falls, accidents	Avoid (may be appropriate for severe anxiety, RBD)	Moderate	Strong

https://www.guidelinecentral.com/summaries/american-geriatrics-society-2015-updated-beers-criteria-for-potentially-inappropriate-medication-use-in-older-adults/#section-date

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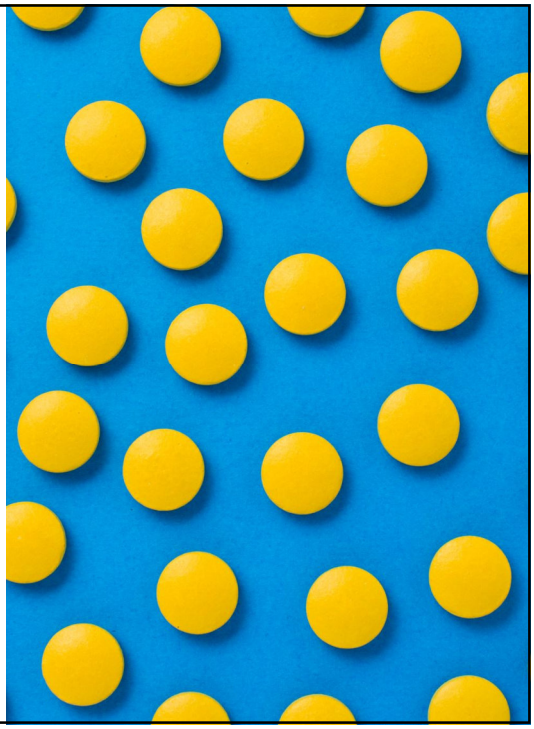
Drug Classes commonly used as hypnotics

- Antidepressants
- Benzodiazepine Receptor Agonists (“Z-drugs”)
- Benzodiazepines
- Anticonvulsants
- Antihistamines
- Orexin antagonists
- Dopamine antagonists
- GABA-B receptor agonists
- Melatonin and melatonin agonists



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Common Hypnotic Antidepressants

Drug	Classification	Half Life	Dose Range for Insomnia	Comments
Amitriptyline	Tricyclic	10-40 h	10-150mg	Strongly anticholinergic
Doxepin	At low dose: central antihistaminergic	15-30 h	3-6mg (0.3 to 0.6 mL with 10mg/mL elixir)	No signal for harm vs placebo in seniors, at doses 3-6mg
Mirtazepine	Tetracyclic	20-40h	7.5-15mg	May be associated with SIADH/hyponatremia in seniors. Doses>15mg may be activating
Trazadone	Serotonin modulator	~5-9h	25-100mg	Anticholinergic, QT prolongation

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Benzodiazepine Receptor Agonists

Drug	Half Life	Dose Range for Insomnia	Comments
Zaleplon	1h	Up to 20mg	Short acting, may be used for middle-of the night awakenings to assist returning to sleep
Zolpidem	3-4h	2.5-10mg (immediate release); 6.25-12.5mg (sustained release) 1.75-3.5mg (sublingual)	Most likely agent to induce complex behaviors during sleep (eg: sleepwalking)
Eszopiclone	6h	1-3mg	Strange metallic taste sensation in the morning is common

All drugs in this class carry an FDA “Black Box” warning regarding complex behaviors (ie: sleep walking). This adverse effect is more common if drugs are combined with alcohol or other sedatives, and can emerge without warning, even after a period of nonproblematic use.

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Benzodiazepines

Drug	Half-Life Subclass	Half Life	Typical Dose Range for Insomnia	Comments
Triazolam	Short-acting	1.5-5.5h	0.25-0.5mg	
Temazepam	Short-acting	8-9h	7.5-30mg	
Alprazolam	Short-acting	11-16h	0.25mg-1mg	
Lorazepam	Short-acting	14h	0.25-1mg	
Clonazepam	Long-acting	20-50h	0.25-1mg	Drug of choice for dream enactment behavior of REM sleep behavior disorder and for sleepwalking. Long half-life may cause daytime impairment

Benzodiazepine habituation with requirement for dose escalation is common for long term use. Less problematic with longer acting agents (eg: when clonazepam is used to treat RBD, response to low dose may remain stable for years).

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Other Drugs

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Class	Drug	Half Life	Typical Dose Range for Insomnia	Comments
Anticonvulsant	Gabapentin	5-7h	100-600mg	Helpful for insomnia associated with neuropathic pain, restless legs syndrome, periodic limb movements of sleep, menopausal hot flashes. May cause hangover effect with daytime impairment.
Anticonvulsant	Pregabalin	6-7h	50-150mg	As above. More likely to cause daytime impairment than gabapentin. May have abuse potential.
Antihistamine	diphenhydramine	4-9h	25-50mg	Strongly anticholinergic
Antihistamine	Hydroxyzine	20-25h	10-100mg	May help reduce anxiety, anticholinergic
Orexin antagonist	Suvorexant (Belsomra)	12h	5-20mg	Long half life may cause daytime impairment; expensive
GABA-B receptor agonist	Sodium oxybate (Xyrem)	60min	Up to 4.5g at bedtime and again 2h later	Highly regulated drug; only FDA approved indication is Narcolepsy; very expensive

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Other Drugs

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Class	Drug	Half Life	Typical Dose Range for Insomnia	Comments
Melatonin agonists	Melatonin "supplements"	~1h	Up to 10mg	Timing of melatonin may be important (see discussion on Process C). Melatonin exposure on second half of night may delay sleep phase. Low dose melatonin (5h before sleep onset) advances sleep phase. May be helpful in treating insomnia related to Beta Blocker therapy (beta blockers suppress natural melatonin release). No signal for habituation or nocturnal injury. Good choice for seniors. Higher doses (up to 12mg) show efficacy in treating RBD.
Melatonin agonists	Ramelteon (Rozerem)	2-5h	8mg	Expensive.
Dopamine antagonists	Quetiapine	6-7h	25-100mg	Metabolic consequences, weight gain, daytime impairment common. Avoid unless using for insomnia associated with comorbid severe psychiatric diagnosis (bipolar disorder, schizoprenia)

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Empowered Sleep Apnea presents: *Your Luxurious Destination…*

Cartoon: McCarty DE--"*Your Luxurious Destination*" originally in: McCarty DE & Stothard E. *Empowered Sleep Apnea: A Handbook For Patients and the People Who Care About Them*. BookBaby Press, NJ (2022)

Cartoon also appeared in: *Sleep Review Magazine, March 2025 issue. Page 16*.

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