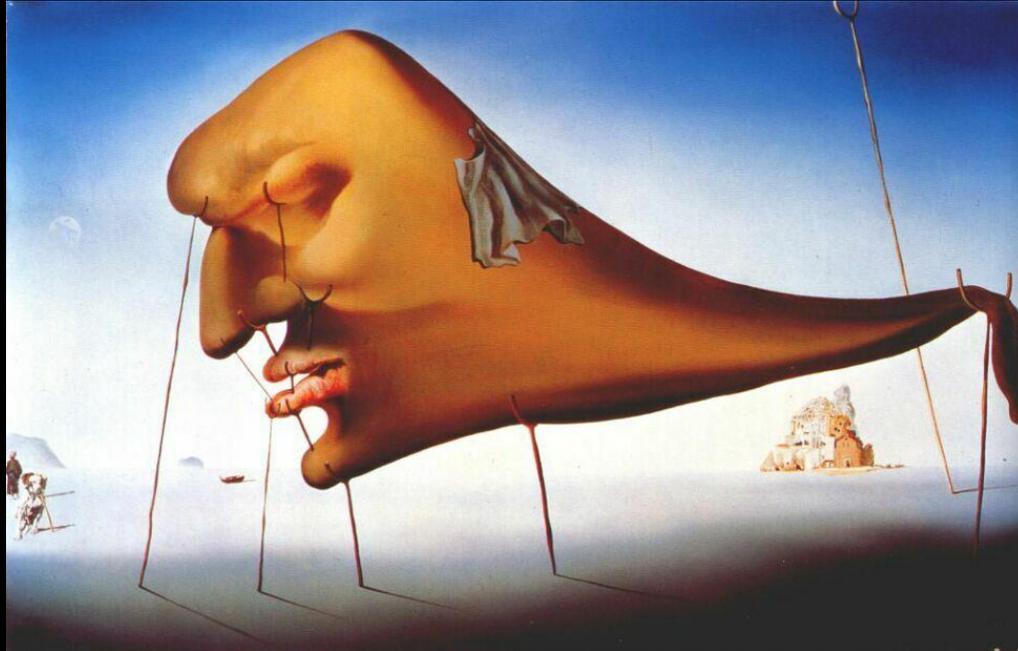


# A Better Night's Sleep: Understanding and Addressing Sleep Disorders for You and Your Patients



Kate Kaplan, Ph.D.

San Mateo County Psychological Association

May 19th, 2018



# Kate Kaplan, Ph.D.

CLINICAL INSTRUCTOR, PSYCHIATRY AND BEHAVIORAL SCIENCES

What Do You Want to  
Know About Sleep?

# Workshop Agenda

- 9:00-9:30 The importance of sleep, sleep health and the intersection of sleep and psychology
- 9:30-10:00 Introduction to sleep physiology and sleep across the lifespan
- 10:00-10:30 Light, caffeine, electronics, and other 'sleep stealers'
- 10:30-10:45 Break
- 10:45-11:30 Sleep Scenario #1: The Sleepy Teen (assessing and addressing circadian rhythm disorders)
- 11:30-12:00 Sleep Scenario #2: The Young Adult with Nightmares (understanding and addressing Nightmare Disorder)
- 12:00-1:00 Lunch
- 1:00-2:00 Sleep Scenario #3: The Adult Who Can't Sleep (theoretical models on the etiology and pathophysiology of insomnia; defining and assessing insomnia, pharmacological and behavioral treatments for insomnia)
- 2:00-2:30 Sleep Scenario #4: The Adult Who Sleeps Too Much (understanding and addressing hypersomnolence in various populations)
- 2:30-3:00 Sleep Scenario #5: The Adult Who Snores (understanding and assessing obstructive sleep apnea; when, how and to whom to refer; treatment options)
- 3:00-3:30 Sleep Scenario #6: The Older Adult Who Naps (improving sleep health in elderly populations)
- 3:30-4:00 Q&A and Course Evaluation (30 minutes)

# HOW SLEEP AFFECTS YOUR HEALTH

## SLEEP DEPRIVATION

### IMPAIRED COGNITION

Lack of sleep impairs memory and your ability to process information.

### INCREASES SYMPTOMS OF DEPRESSION

A lack of sleep disrupts neurotransmitters to the brain which regulates mood.

### HIGHER LEVELS OF ANXIETY

Lack of sleep raises the brain's anticipatory reactions, increasing overall anxiety levels.

### INCREASED RISK OF BREAST CANCER

Melatonin decreases when you are exposed to light late at night. A decrease in melatonin disrupts estrogen production which can lead to breast cancer.

### STROKE RISK

When you sleep 6 hours or less a night, your chance of a stroke increases 4x.

### INCREASED RISK FOR HEART DISEASE

Blood pressure decreases when you sleep.

### INCREASED RISK FOR DIABETES

Lack of sleep increases cortisol and norepinephrine, both are associated with insulin resistance.

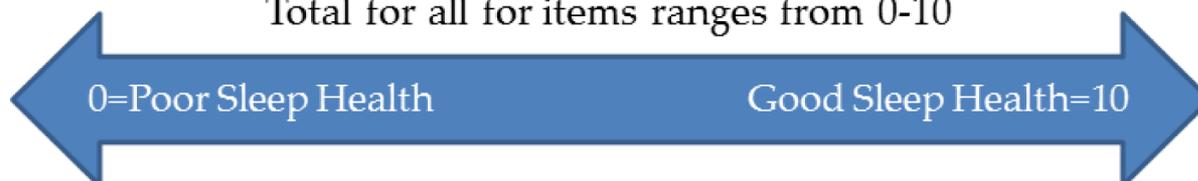
### WEIGHT GAIN

Sleep helps balance hormones that make you feel hungry and full.

# Sleep Health

		Rarely/ Never (0)	Sometimes (1)	Usually/ Always (2)
<u>S</u> atisfaction	Are you satisfied with your sleep?			
<u>A</u> lertness	Do you stay awake all day without dozing?			
<u>T</u> iming	Are you asleep (or trying to sleep) between 2:00 a.m. and 4:00 a.m.?			
<u>E</u> fficiency	Do you spend less than 30 minutes awake at night? (This includes the time it takes to fall asleep and awakenings from sleep.)			
<u>D</u> uration	Do you sleep between 6 and 8 hours per day?			

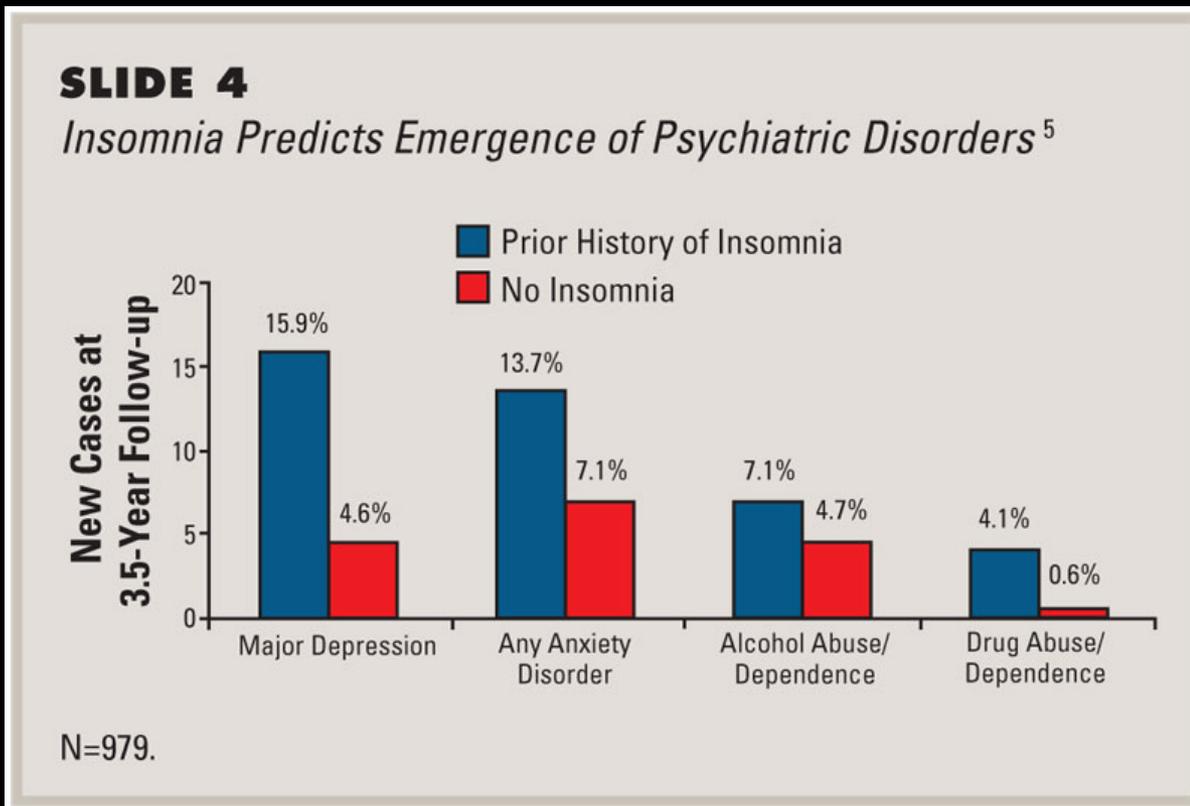
Total for all for items ranges from 0-10



Sleep Measure	Associated Health Outcomes	Sample References
Satisfaction/Quality	Mortality	Kojima et al., 2000 <sup>65</sup> ; Elder et al., 2008 <sup>66</sup> ; Rod et al., 2011 <sup>67</sup> ; Hublin et al., 2011 <sup>68</sup>
	Metabolic Syndrome	Jennings et al., 2009 <sup>69</sup> ; Troxel et al., 2010 <sup>70</sup>
	Diabetes/impaired glucose metabolism	Vgontzas et al., 2009 <sup>71</sup> ; Haseli-Mashhadi et al., 2009 <sup>72</sup> ; Knutson et al., 2011 <sup>73</sup> ; Pyykkonen et al., 2012 <sup>74</sup>
	Hypertension	Vgontzas et al., 2009 <sup>75</sup> ; Fiorentini et al., 2007 <sup>76</sup> ; Rod et al., 2011 <sup>67</sup>
	Coronary heart disease	Laugsand et al., 2011 <sup>77</sup> ; Hoevenaar-Blom, 2011 <sup>78</sup> ; Appelhans, 2013 <sup>79</sup>
	Depression	Baglioni, 2011 <sup>80</sup>
Alertness/Sleepiness/ Napping	Mortality	Hays, 1996 <sup>81</sup> ; Newman et al., 2000 <sup>82</sup>
	Coronary heart disease	Newman et al., 2000 <sup>82</sup> ; Sabanayagam et al., 2011 <sup>83</sup>
	Impaired neurobehavioral performance	Dinges et al., 1997 <sup>84</sup>
Timing (e.g., shift work, chronotype)	Mortality	Åkerstedt et al., 2004 <sup>85</sup>
	Coronary heart disease	Kawachi et al., 1995 <sup>86</sup> ; Frost et al., 2009 <sup>87</sup>
	Metabolic syndrome	Karlsson et al., 2001 <sup>88</sup> ; Lin et al., 2009 <sup>89</sup> ; Pietroisti et al., 2010 <sup>90</sup>
	Diabetes/impaired glucose metabolism	Pan et al., 2011 <sup>91</sup> ; Buxton et al., 2012 <sup>92</sup> ; Reutrakul et al., 2013 <sup>93</sup>
	Accidents	Folkark and Åkerstedt, 2004 <sup>94</sup> ; Barger et al., 2005 <sup>95</sup>
Efficiency (sleep latency, wake after sleep onset)	Mortality	Newman et al., 2000 <sup>82</sup> ; Nilsson et al., 2001 <sup>96</sup> ; Mallon et al., 2002 <sup>97</sup> ; Dew et al., 2003 <sup>98</sup>
	Metabolic syndrome	Troxel et al., 2010 <sup>70</sup>
	Diabetes/impaired glucose metabolism	Cappuccio et al., 2010 <sup>99</sup> ; Engeda et al., 2013 <sup>100</sup> ; Kawakami et al., 2004 <sup>101</sup> ; Knutson et al., 2011 <sup>73</sup> ; Lou, 2012 <sup>102</sup>
	Hypertension	Vgontzas et al., 2009 <sup>75</sup> ; Javaher et al., 2008 <sup>103</sup> ; Phillips and Mannino, 2007 <sup>104</sup>
	Coronary heart disease	Laugsand et al., 2011 <sup>77</sup> ; Grandner et al., 2012 <sup>105</sup>
	Depression	Baglioni et al., 2011 <sup>80</sup>
Duration	Mortality	Wingard and Berkman, 1983 <sup>106</sup> ; Kripke et al., 2002 <sup>107</sup> ; Hublin et al., 2007 <sup>108</sup> ; Youngstedt et al., 2004 <sup>109</sup>
	Obesity	Gangwisch et al., 2005 <sup>110</sup> ; Cappuccio et al., 2008 <sup>111</sup> ; Hasler et al., 2004 <sup>112</sup> ; Buxton et al., 2010 <sup>113</sup>
	Metabolic Syndrome	Hall et al., 2008 <sup>114</sup>
	Diabetes	Ayas et al., 2003 <sup>115</sup> ; Gottlieb et al., 2005 <sup>116</sup> ; Yaggi et al., 2006 <sup>117</sup>
	Hypertension	Gottlieb et al., 2006 <sup>118</sup> ; Gangwisch et al., 2006 <sup>119</sup> ; Cappuccio et al., 2007 <sup>120</sup> ; Stranges et al., 2010 <sup>121</sup>
	Coronary heart disease	Mallon et al., 2002 <sup>97</sup> ; Ayas et al., 2003 <sup>122</sup> ; Hoevenaar-Blom et al., 2011 <sup>78</sup>
	Impaired neurobehavioral performance	Van Dongen et al., 2003 <sup>123</sup> ; Van Dongen et al., 2004 <sup>124</sup> ; Belenky et al., 2003 <sup>125</sup>

# Significance of Insomnia

- Insomnia predicts first-onset and recurrence of psychological disorders

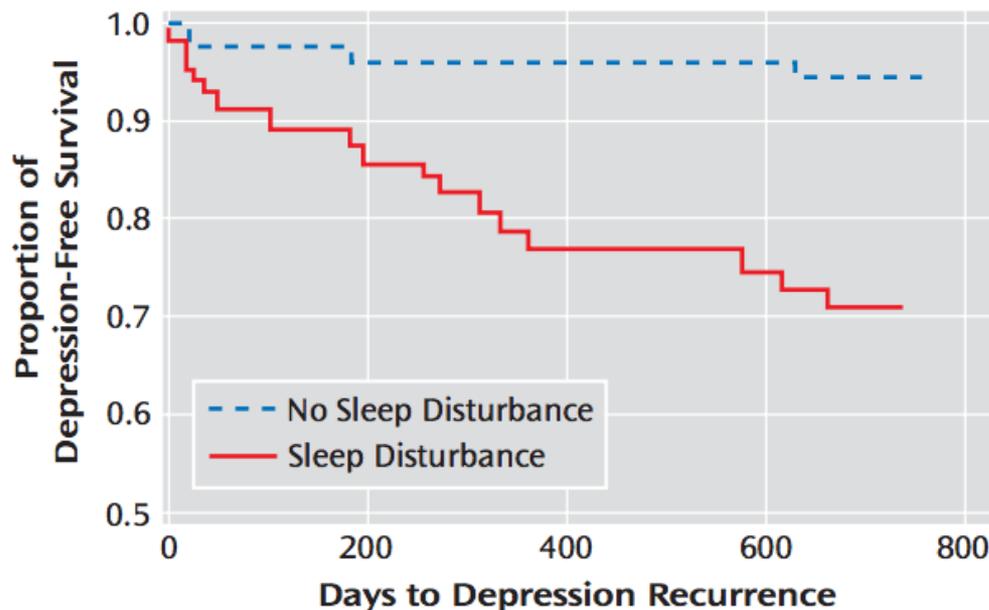


Breslau et al., 1998; c.f.  
Krystal, 2007

# Significance of Insomnia

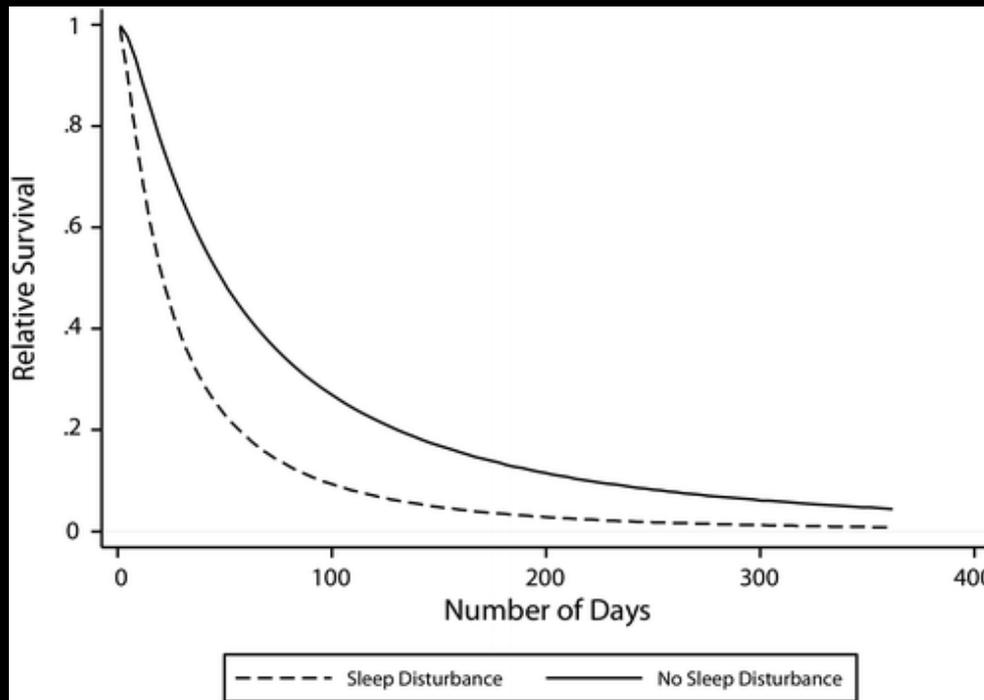
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**FIGURE 1. Time to Depression for Older Adults With a Prior Depression History According to Sleep Disturbance at Baseline**



# Significance of Insomnia

- Insomnia predicts first-onset and recurrence of psychological disorders
- Insomnia is related to suicide completion

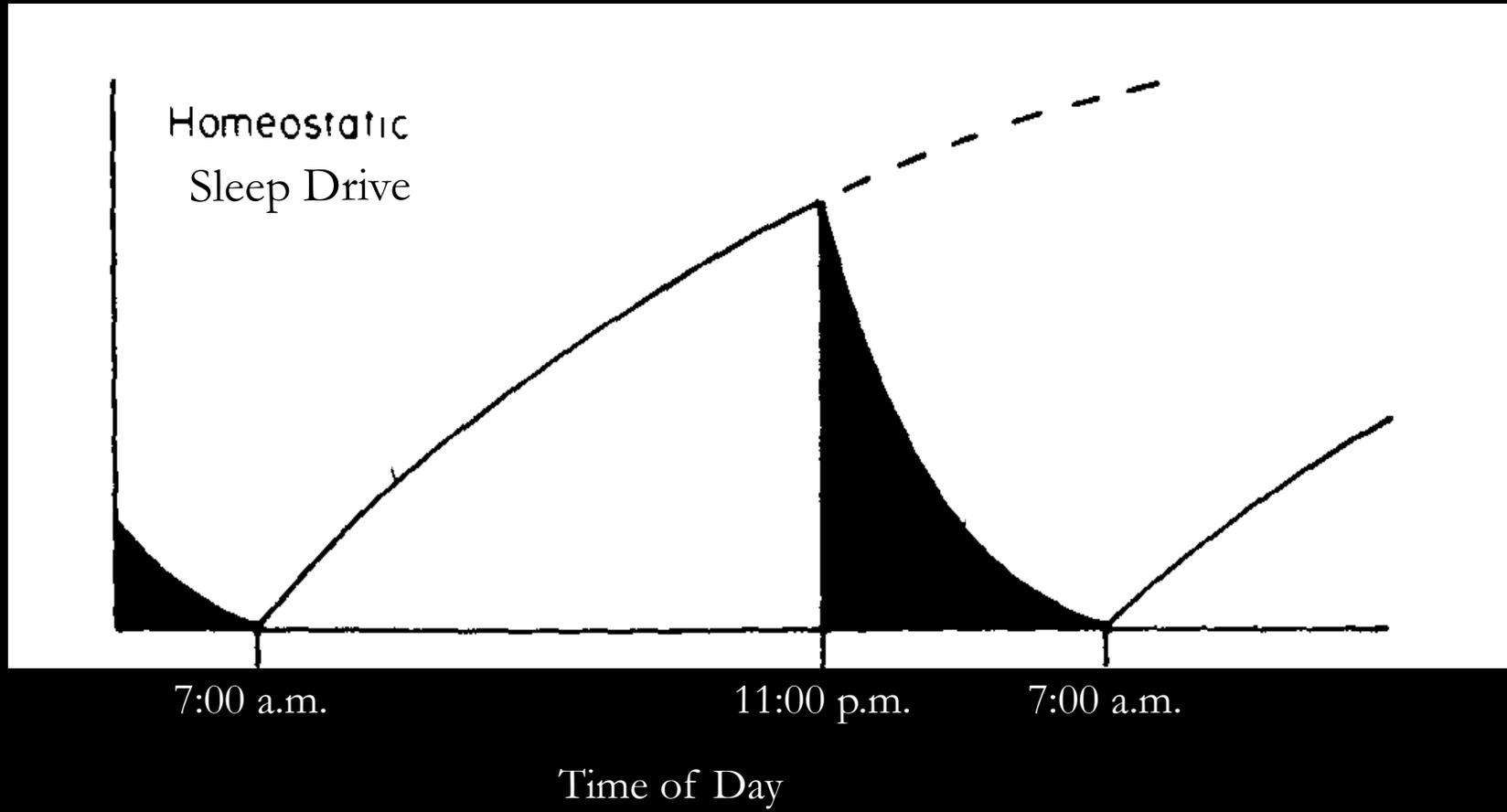


Pigeon et al., 2012;  
Goldstein et al., 2008

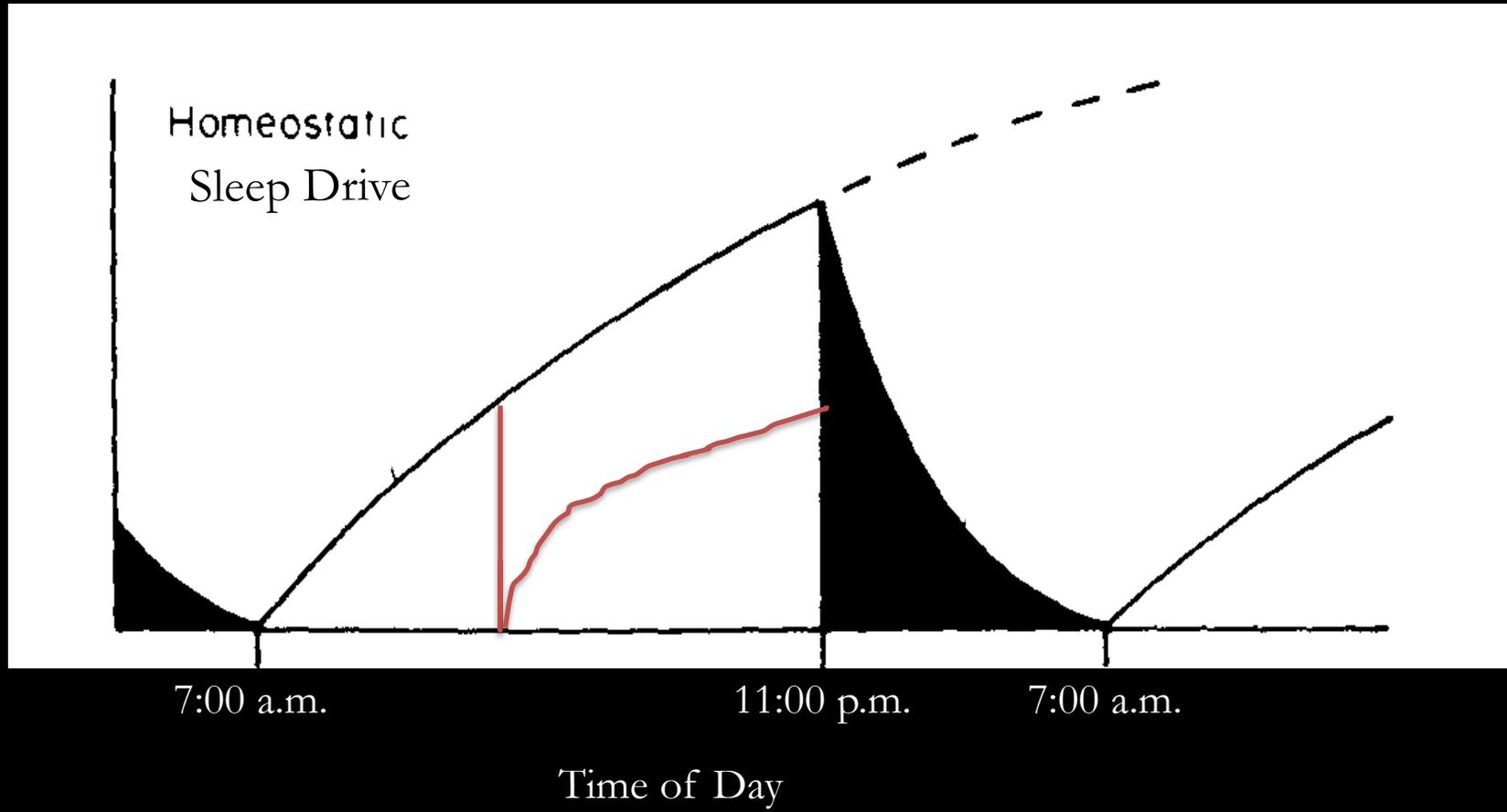
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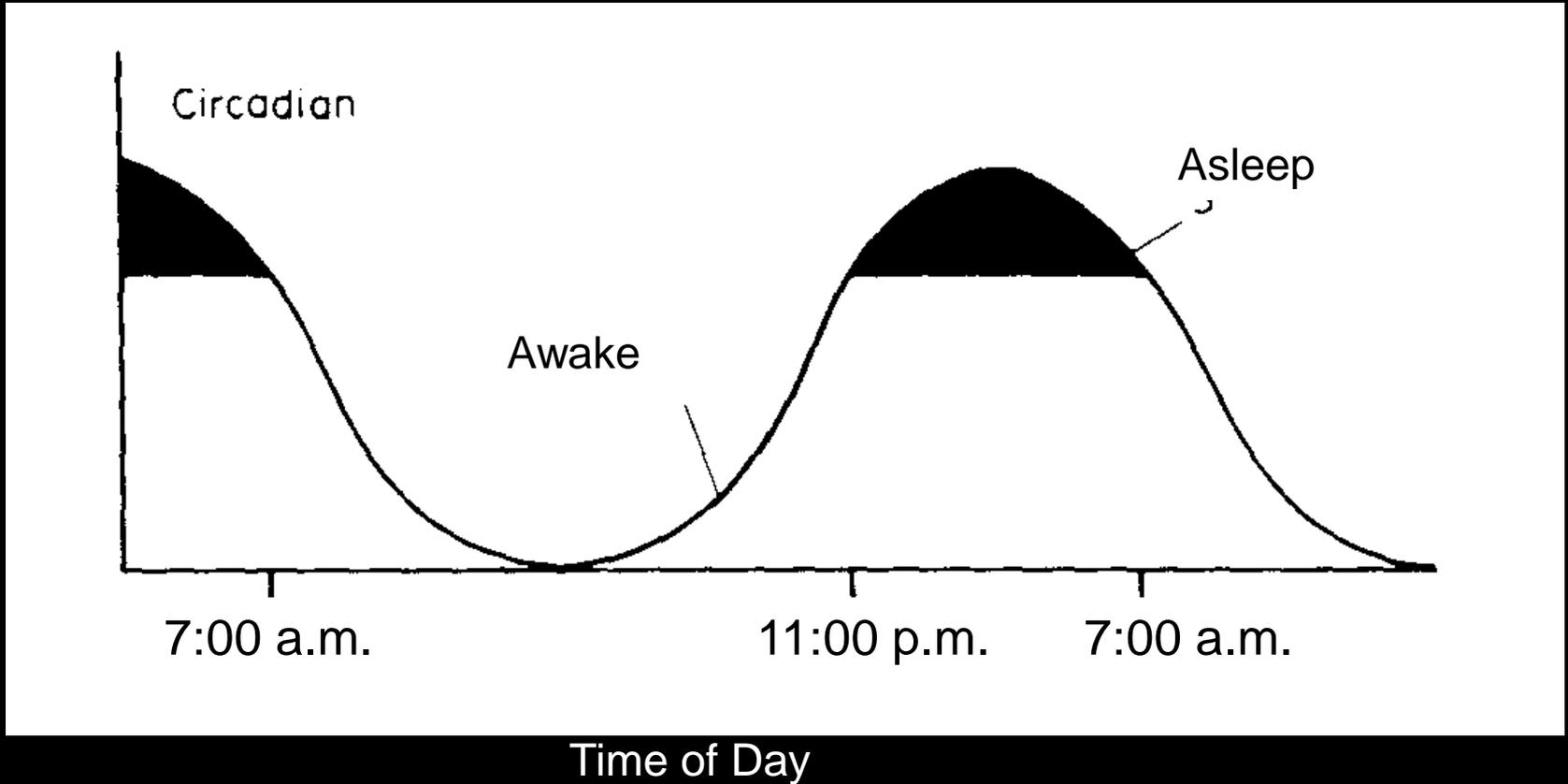
# Homeostatic Sleep Drive

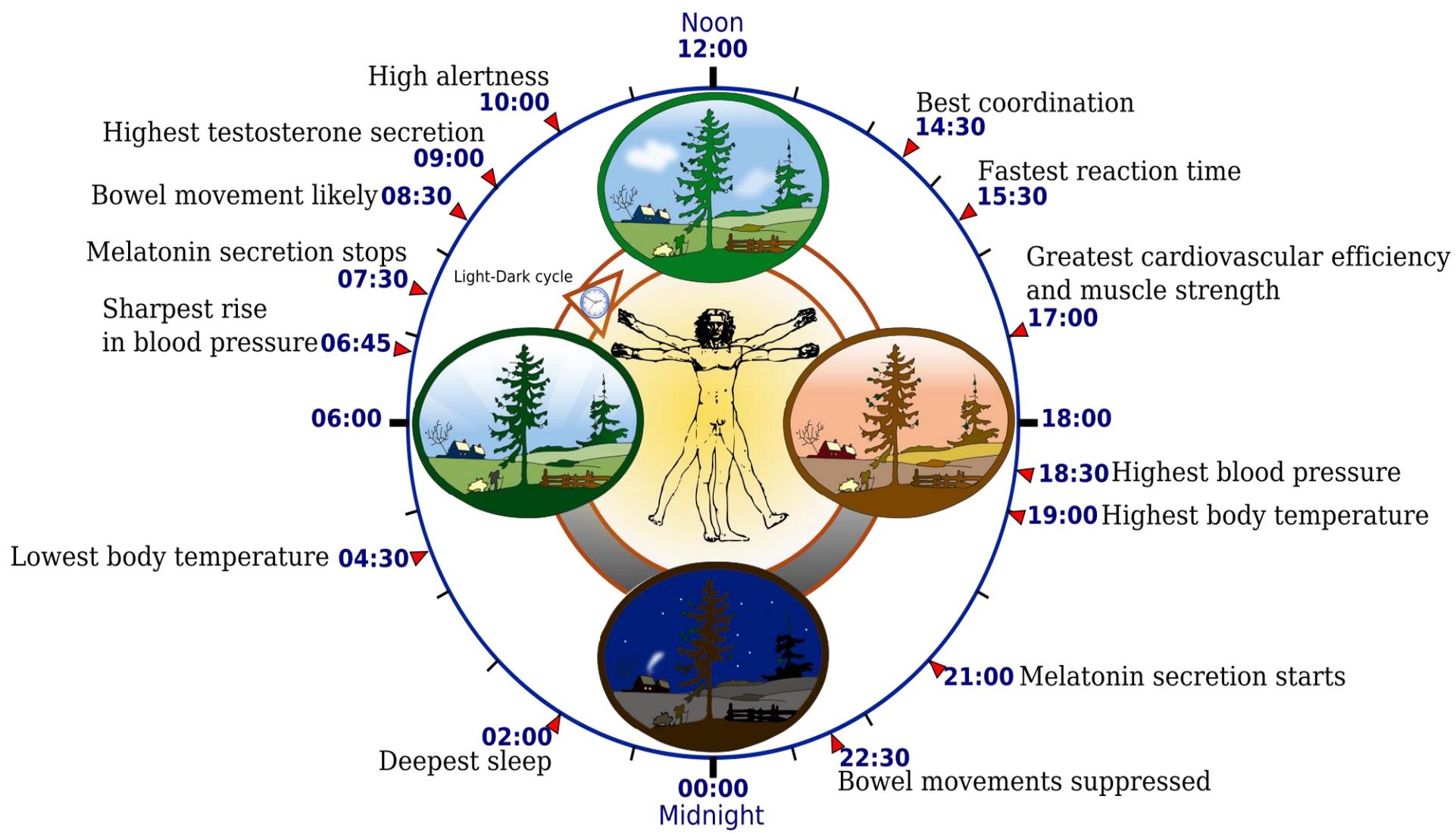


# Homeostatic Sleep Drive

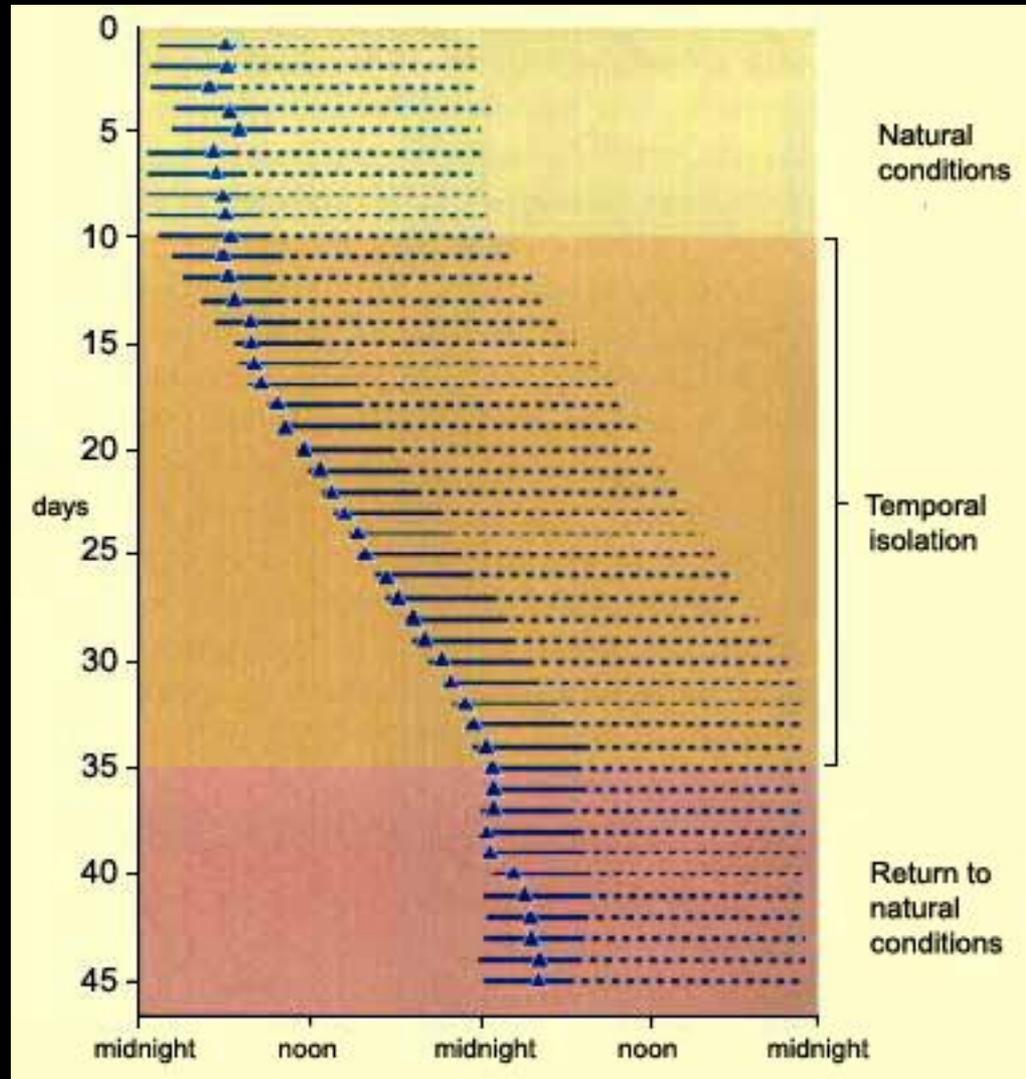


# The Circadian System



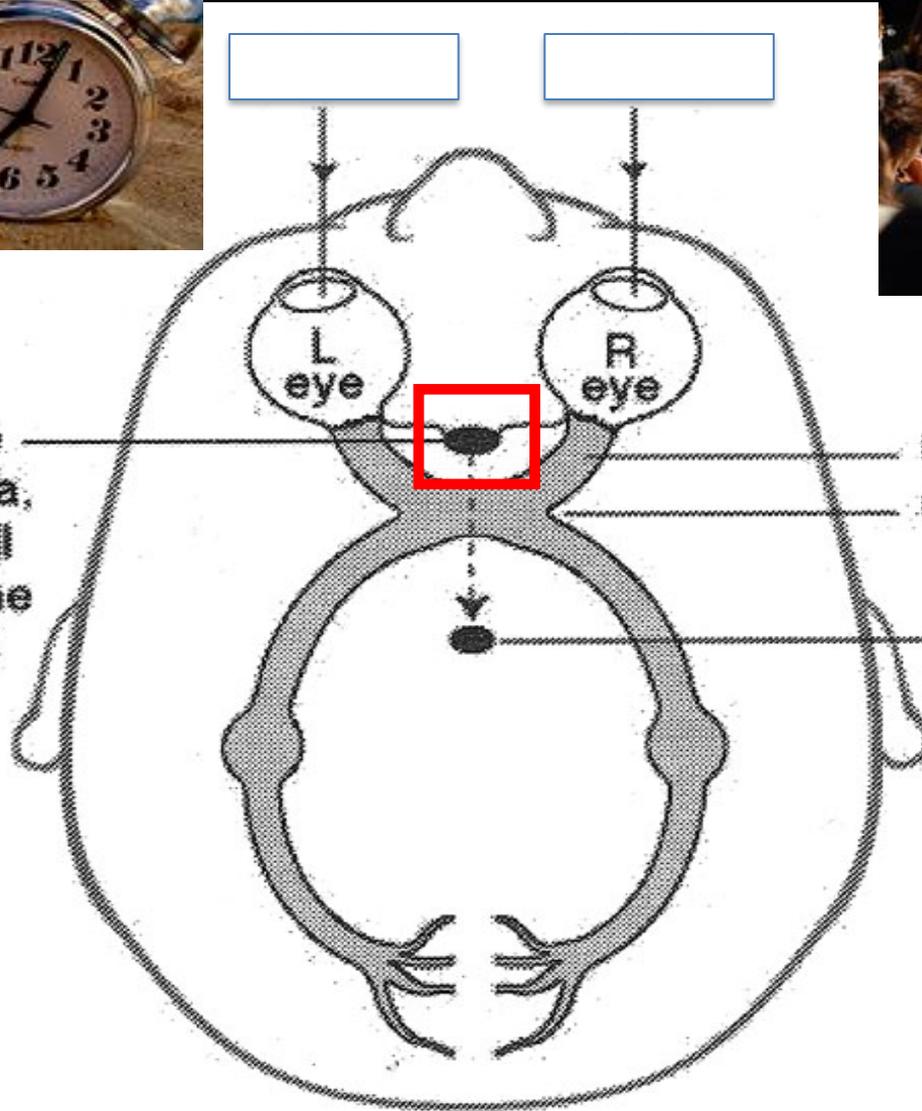


# The Circadian System is Longer than 24 Hours





SCN lying above the optic chiasma, supplied by small branches from the two optic nerves



Optic nerve  
Optic chiasma

Pineal gland, linked to the SCN by a neural pathway

# Warm Up

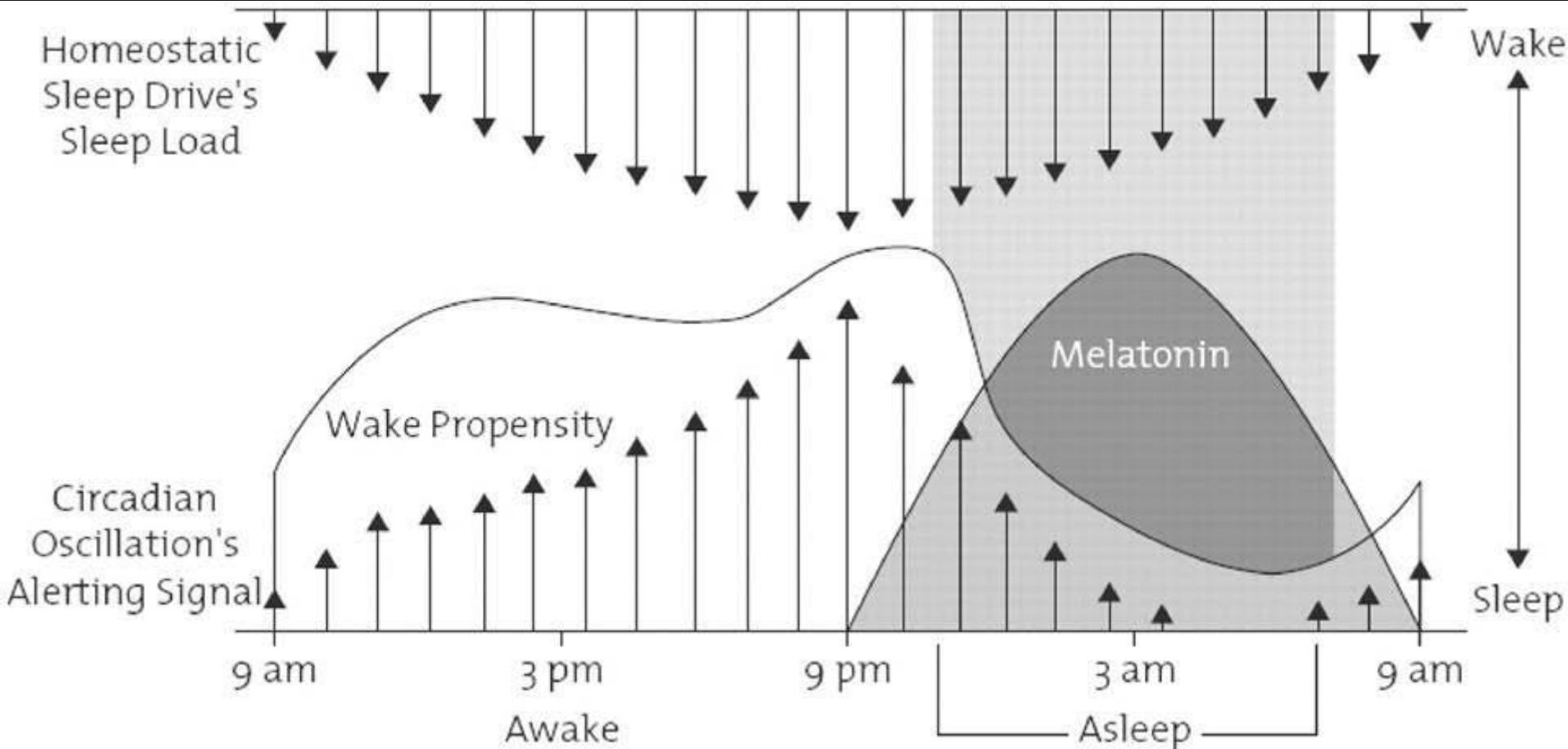
1. What time do you usually get out of bed on weekdays?
2. What time do you usually get out of bed on weekends?

Calculate the difference between #1 and #2, and stand up when you have your answer

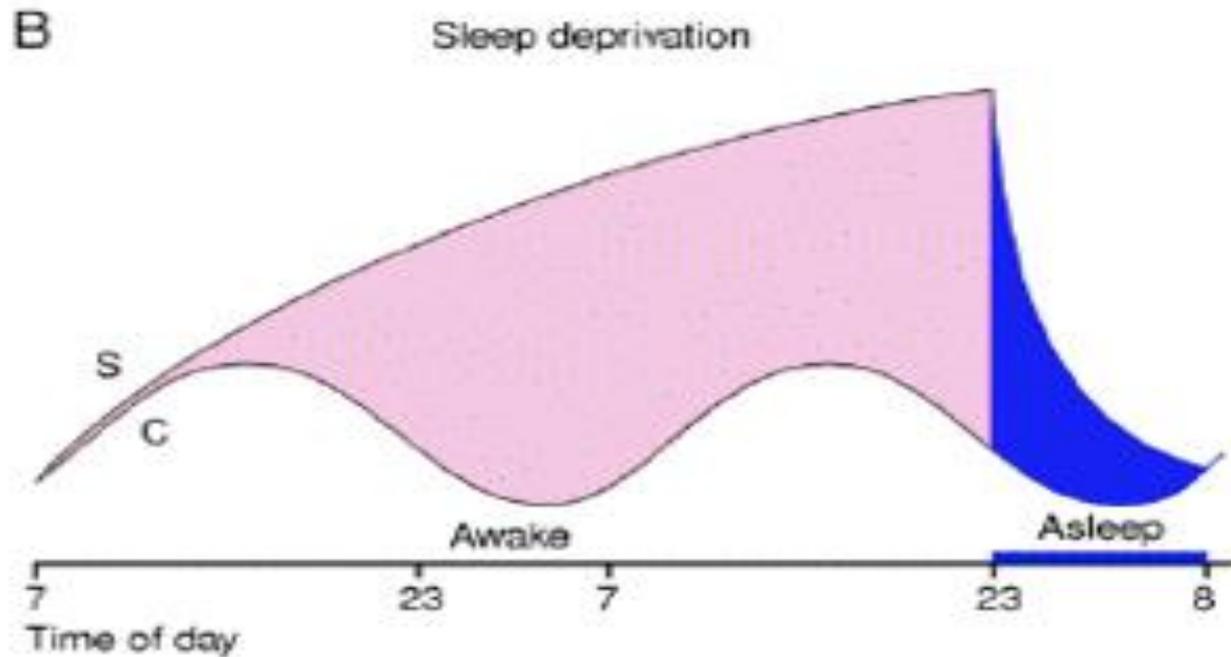
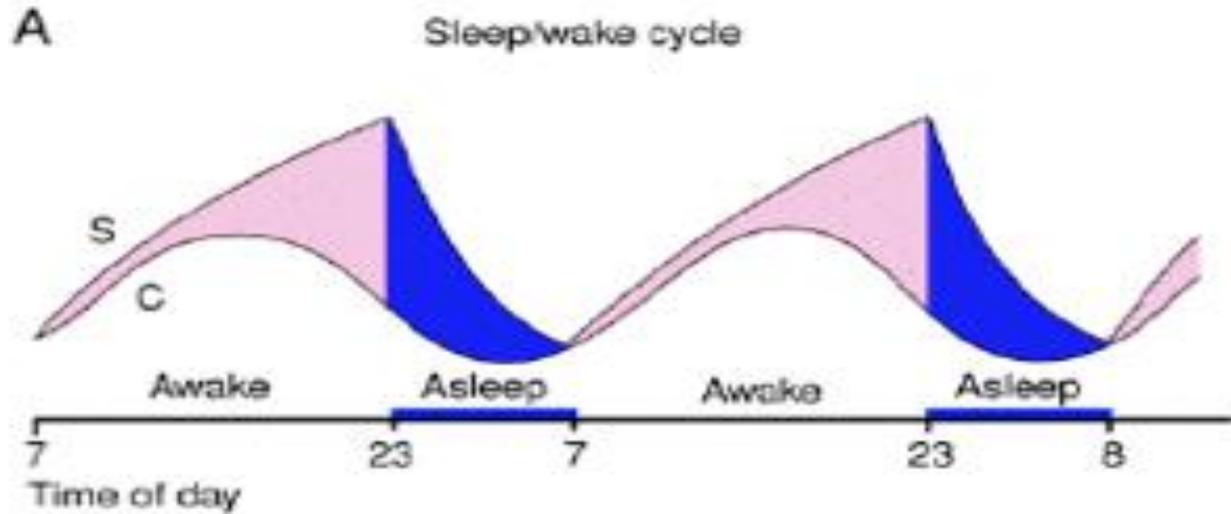
# Warm Up



# These two processes work together



# These two processes work together



# Measuring Sleep

- Retrospective Self Report\*\*\*
- Sleep Diary\*\*\*
- Actigraphy
- Polysomnography



1. Please rate the current (i.e., last two weeks) SEVERITY of your insomnia problem(s):

	None	Mild	Moderate	Severe	Very
Difficulty falling asleep:	0	1	2	3	4
Difficulty staying asleep:	0	1	2	3	4
Problem waking up too early:	0	1	2	3	4

2. How SATISFIED/dissatisfied are you with your current sleep pattern?

Very satisfied		Moderately satisfied		Very dissatisfied
0	1	2	3	4

3. To what extent do you consider your sleep problem to INTERFERE with your daily functioning (e.g., daytime fatigue, ability to function at work/daily chores, concentration, memory, mood, etc.)?

Not at all	A little	Somewhat	Much	Very much
0	1	2	3	4

4. How NOTICEABLE to others do you think your sleeping problem is in terms of impairing the quality of your life?

Not at all Noticeable	Barely	Somewhat	Much	Very much Noticeable
0	1	2	3	4

5. How WORRIED/DISTRESSED are you about your current sleep problem?

Not at all	A little	Somewhat	Much	Very much
0	1	2	3	4

# Self-report measures: Prospective

Sleep diary completed immediately on waking over multiple nights

1) Today is: Sun Mon Tues Wed Thurs Fri Sat Today's date is: -  
\_\_\_\_\_

2) Last night I got into bed at \_\_\_ : \_\_\_ AM PM

3) I actually tried to go to sleep at \_\_\_ : \_\_\_ AM PM

4) I think it took me about \_\_\_ minutes to fall asleep.

5) Last night after I finally fell asleep, I woke up this many times during the night (circle one):  
0 1 2 3 4 5 or more

6) Altogether, I was awake for a total of \_\_\_\_\_ minutes during the night.

7) Last night I think altogether I slept \_\_\_ hours, \_\_\_ minutes.

8) This morning I woke up at \_\_\_ : \_\_\_ AM PM

9) This morning I actually got out of bed to start my day at \_\_\_ : \_\_\_ AM PM

10) Was anyone present in the room with you when you got out of bed?

No, I was alone  Yes

11) If yes, who was with you when you got out of bed? Please check all that apply.

Spouse/Partner \_\_\_\_\_  Other Family Members \_\_\_\_\_

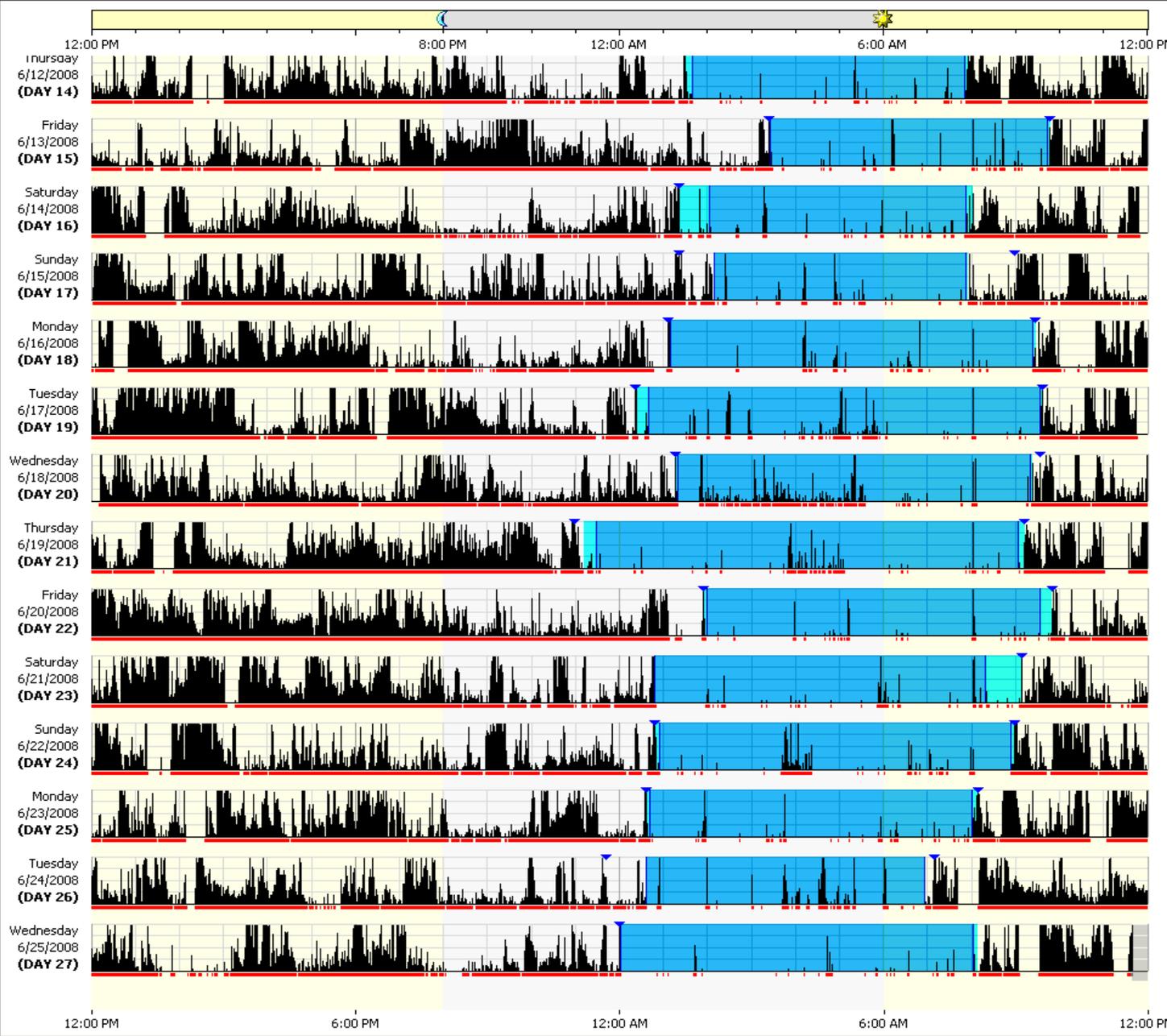
Children \_\_\_\_\_  Other Person(s) \_\_\_\_\_

# Actigraphy





- Database Viewer
- + Subj 122 wk
  - + subj 127 wk
  - + SUBJ 127 W
  - + Subj 130 wk
  - + SUBJ 132 W
  - + Subj 132 wk
  - + subj 133 wk
  - + subj 14 wks
  - + subj 14 wks
  - + subj 15 wks
  - + subj 15 wks
  - + subj 16 wks
  - + subj 16 wks
  - + subj 17 2nd
  - + subj 17 wks
  - + subj 17 wks
  - + subj 18 wks
  - + subj 21 wks
  - + subj 21 wks
  - + subj 22 wks
  - + Subj 22 wks
  - + SUBJ 22\_2nd
  - + subj 23 wks
  - + subj 26 wks
  - + subj 26 wks
  - + subj 28 wks
  - + subj 28 wks
  - + subj 30 wks
  - + subj 30 wks
  - + subj 31 wks
  - 5/30/20
  - New sub:
  - sub:
  - sub:
  - + subj 31 wks
  - + Subj 32 wks
  - + Subj 32 Wks
  - + subj 33 wks
  - + subj 33 wks
  - + subj 34 wks
  - + subj 34 wks
  - + subj 35 wks
  - + Subj 35 wks
  - + Subj 36 wks
  - + subj 36 wks
  - + subj 38 wks
  - + subj 40 wks
  - + SUBJ 40\_wk
  - + Subj 41 wks
  - + Subj 41 wks
  - + Subj 42 wks
  - + SUBJ 42\_wk
  - + subj 44 wks
  - + Subj 45 Wks



**Actogram Length**  
Auto (14) Days

**Graph Width**

**Visibility**

**Activity Scale**  
Max: 1000  
Min: Auto (0)

**White Light Scale**

**Color Light Scale**

**Light/Dark Bar**  
On: 6:00 AM  
Off: 8:00 PM

All Light  
 All Dark

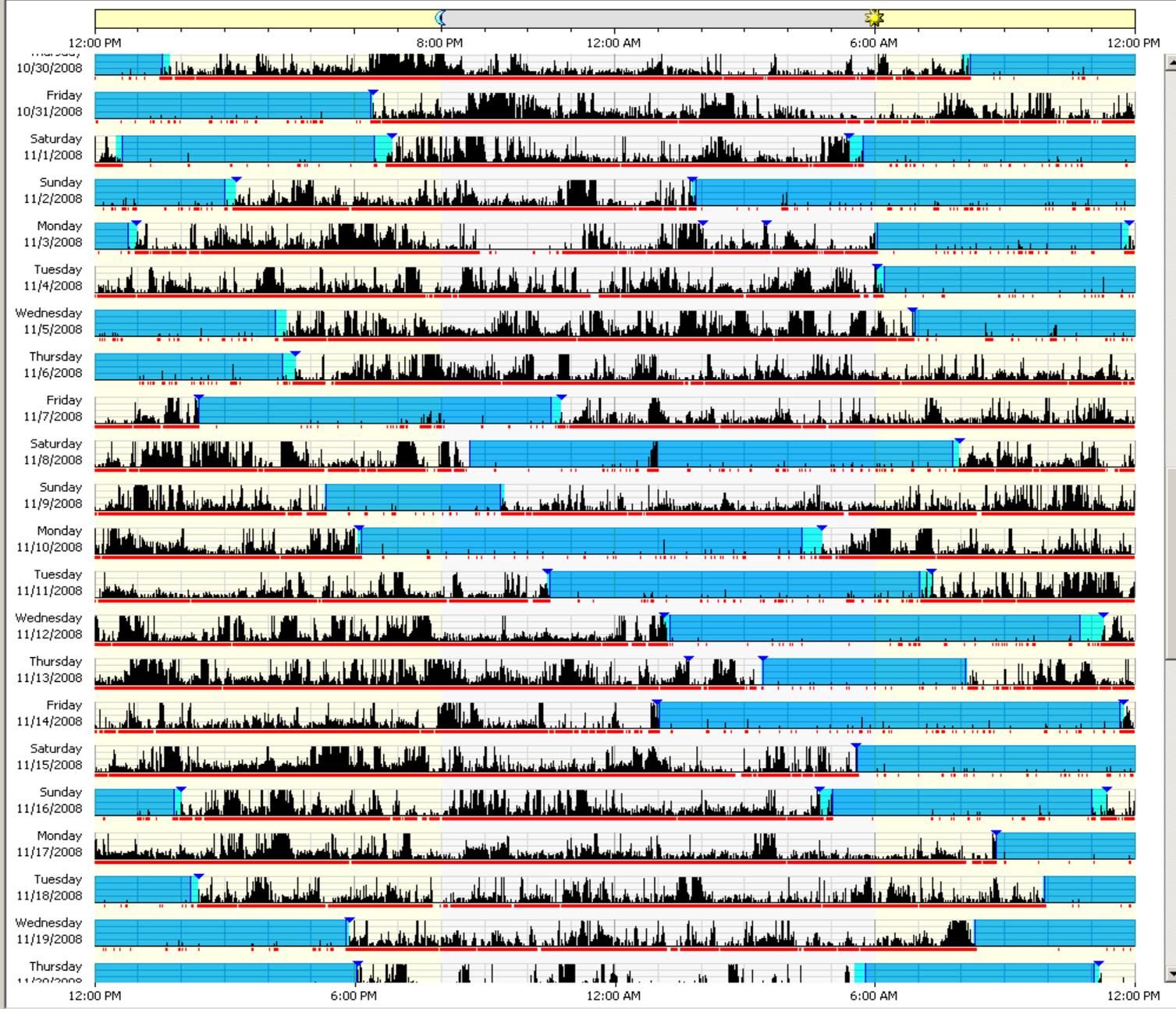
**Interval Legend**

- Rest (R)
- Custom (C)
- Excluded (E)
- Forced Wake (W)
- Forced Sleep (S)
- Sleep (Info)

To set an interval:  
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2. Right-click or use [keyboard controls](#) to set intervals.



- Database View...
- subj 40 w
- SUBJ 40
- Subj 41 w
- Subj 41 w
- Subj 42 w
- SUBJ 42\_
- Subj 44 w
- Subj 45 V
- Subj 45 w
- Subj 45 w
- SUBJ 49\_
- SUBJ 49\_
- subj 51 w
- subj 51 w
- Subj 53 V
- subj 53 w
- subj 53 w
- Subj 53\_
- Subj 54 w
- Subj 54 w
- Subj 55 w
- subj 55 w
- Subj 56 w
- Subj 56 w
- SUBJ 57\_
- Subj 59 V
- subj 59 w
- Subj 60 w
- Subj 60 w
- subj 62\_
- subj 62\_
- SUBJ 66\_
- subj 66\_
- subj 67 w
- Subj 67 w
- Subj 68 w
- Subj 68 w
- subj 69 w
- 10/24/2008
- A
- S
- A
- S
- Subj 69 V
- 11/2/2008
- A
- S
- A
- S
- Subj 71 V
- SUBJ 71\_
- subj 72 w
- subj 72 w
- subj 74 w
- SUBJ 74\_
- subj 76 w
- subj 76 w



**Actogram Length**  
21 Days

**Graph Width**

**Visibility**

**Activity Scale**  
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Min: Auto (0)

**White Light Scale**

**Color Light Scale**

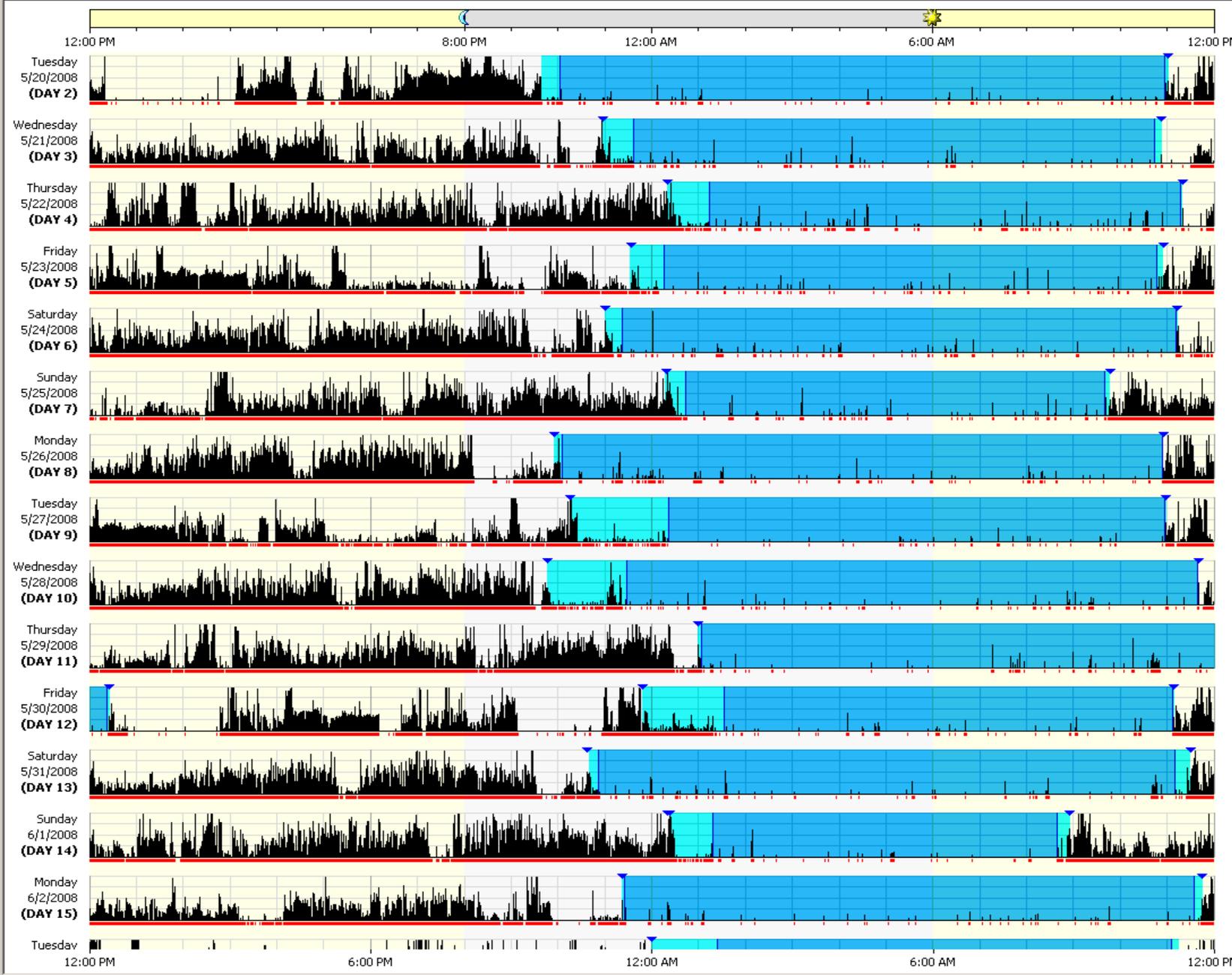
**Light/Dark Bar**  
On: 6:00 AM  
Off: 8:00 PM

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**Actogram Length**  
Auto (14) Days

**Graph Width**  
[Dropdown] [Dropdown]

**Visibility**  
[Icons for visibility settings]

**Activity Scale**  
Max: 1000  
Min: Auto (0)

**White Light Scale**  
Max: [Dropdown]  
Min: [Dropdown]

**Color Light Scale**  
Max: [Dropdown]  
Min: [Dropdown]

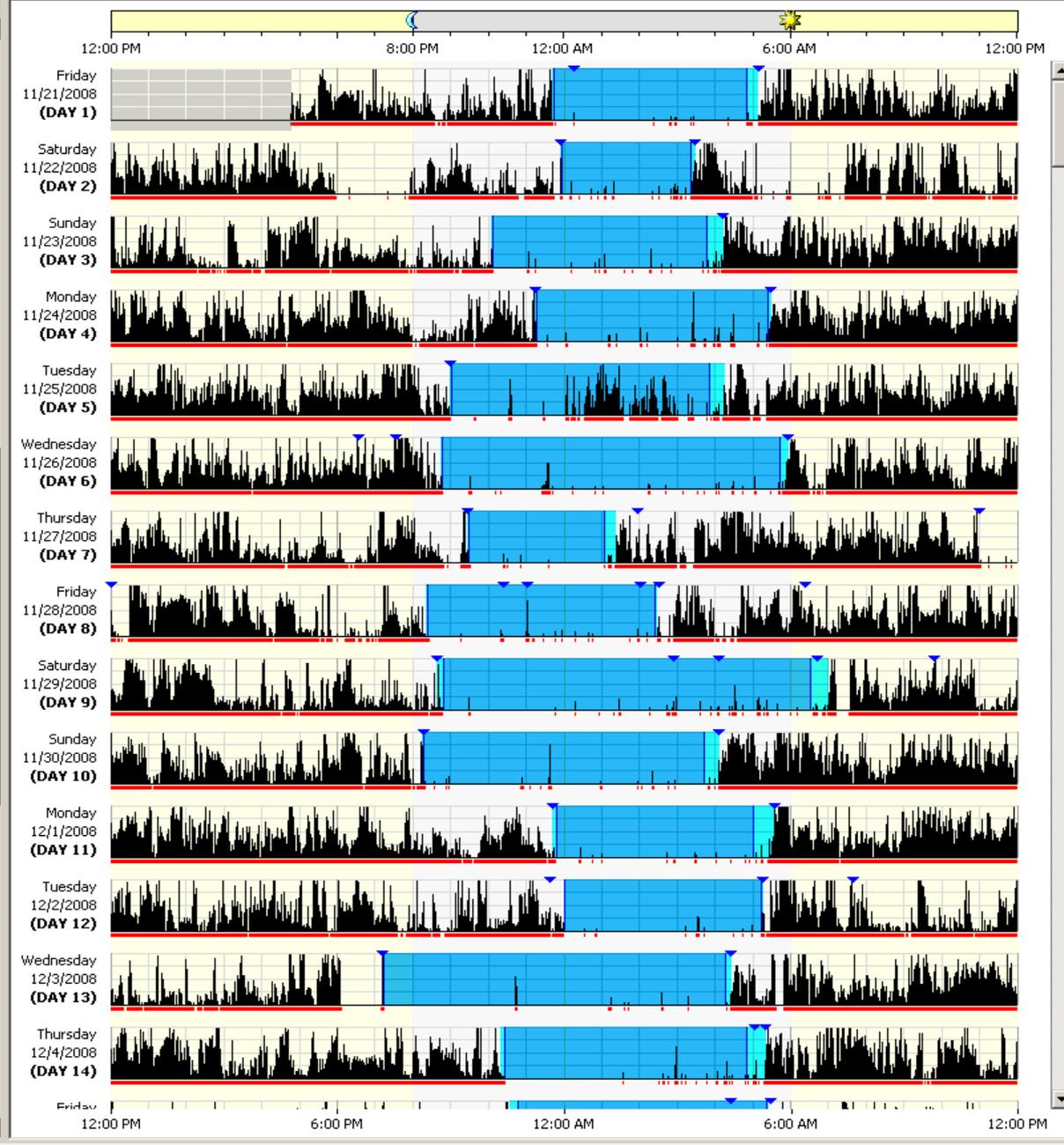
**Light/Dark Bar**  
On: 6:00 AM  
Off: 8:00 PM  
 All Light  
 All Dark

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- subj 26 wks 5-8
- subj 28 wks 1-4
- subj 28 wks 5-8
- subj 30 wks 1-4
- subj 30 wks 5-9
- subj 31 wks 1-4
- subj 31 wks 5-8
- Subj 32 wks 1-4
- Subj 32 Wks 5-8
- subj 33 wks 1-4
- subj 33 wks 5-8
- subj 34 wks 1-4
- subj 34 wks 5-8
- subj 35 wks 1-4
- Subj 35 wks 5-8
- Subj 36 wks 1-4
- subj 36 wks 5-8
- subj 38 wks 1-4 (take 1)
- subj 40 wks 5-7
- SUBJ 40\_Wk1\_4
- Subj 41 wks 5-8
- Subj 41 wks 1-4
- Subj 42 wks 5-8
- SUBJ 42\_WK1\_4
- subj 44 wks 1-4
- Subj 45 Wks 1-4
- Subj 45 wks 1-4 check
- SUBJ 49\_WK1\_4
- SUBJ 49\_WKS\_8
- subj 51 wks 1-4
- subj 51 wks 5-8
- Subj 53 Wks 5-8
- subj 53 wks1-4
- Subj 53\_WK4\_8
- Subj 54 wks 1-4
- Subj 54 wks 5-8
- subj 55 wks 1-4
- subj 55 wks 5-8
- Subj 56 wks 1-4
- subj 56 wks 5-6
- SUBJ 57\_WK1\_4
- subj 58 wks 1-4
- Subj 59 Wks 1-4
- subj 59 wks 5-8
- Subj 60 wks 1-4
- Subj 60 wks 5-7
- 11/21/2008 4:47:00 PM
  - New Analysis
  - subj 60 wks 5-7
  - subj 60 wks 5-7 nap
  - subj 60 wks 5-7\_check
- subj 62\_WK1\_4
- subj 62\_WK5\_8
- SUBJ 66\_WK1\_4
- subj 66\_wks\_8
- subj 67 wks 1-4



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14 Days

**Graph Width**

**Visibility**

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Max: 1000  
Min: Auto (0)

**White Light Scale**

**Color Light Scale**

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On: 6:00 AM  
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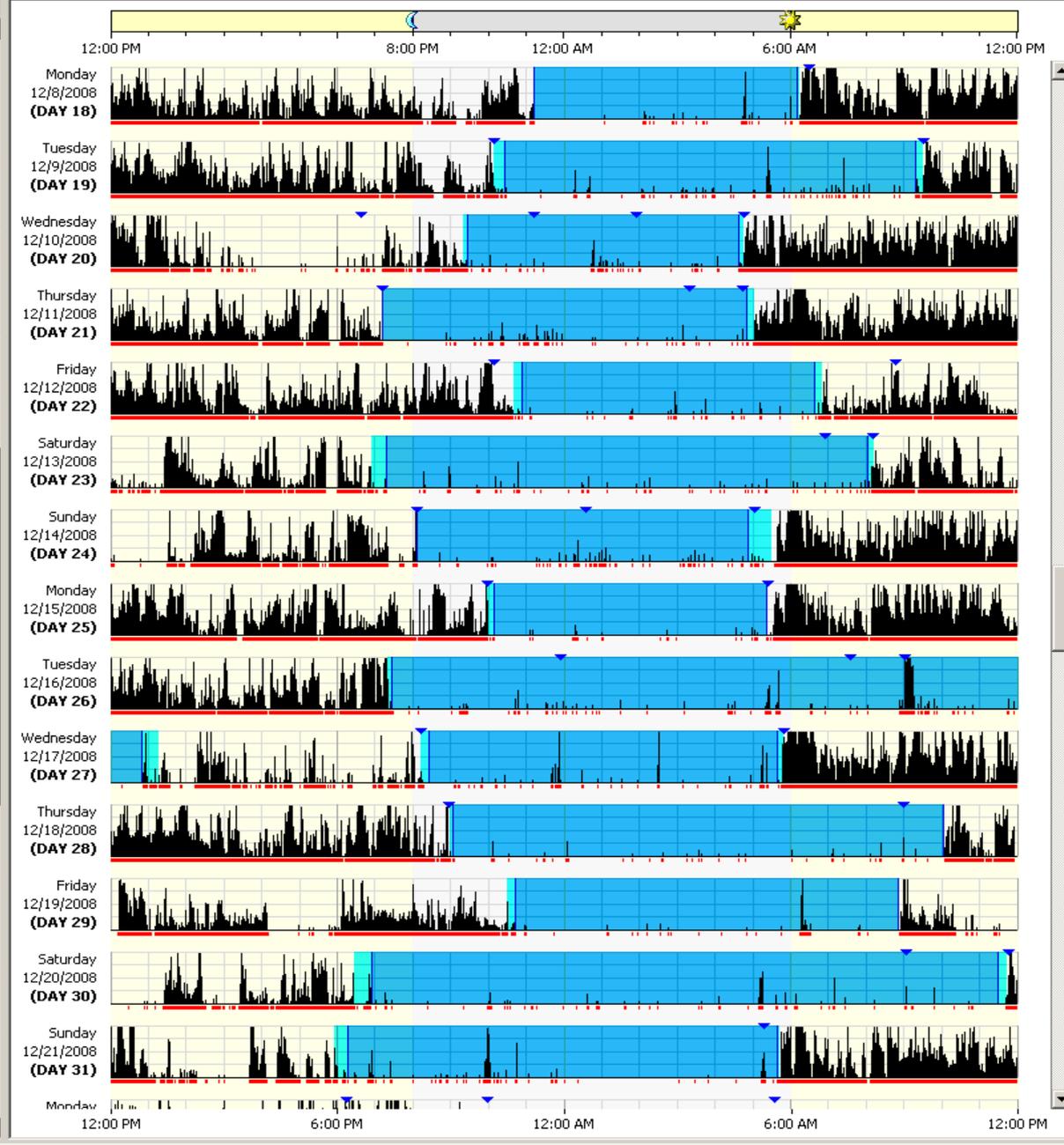
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- subj 31 wks 5-8
- Subj 32 wks 1-4
- Subj 32 Wks 5-8
- subj 33 wks 1-4
- subj 33 wks 5-8
- subj 34 wks 1-4
- subj 34 wks 5-8
- subj 35 wks 1-4
- Subj 35 wks 5-8
- Subj 36 wks 1-4
- subj 36 wks 5-8
- subj 38 wks 1-4 (take 1)
- subj 40 wks 5-7
- SUBJ 40\_Wk1\_4
- Subj 41 wks 5-8
- Subj 41 wks 1-4
- Subj 42 wks 5-8
- SUBJ 42\_WK1\_4
- subj 44 wks 1-4
- Subj 45 Wks 1-4
- Subj 45 wks 1-4 check
- Subj 45 wks 5-8
- SUBJ 49\_WK1\_4
- SUBJ 49\_WKS\_8
- subj 51 wks 1-4
- subj 51 wks 5-8
- Subj 53 Wks 5-8
- subj 53 wks 1-4
- Subj 53\_WK4\_8
- Subj 54 wks 1-4
- Subj 54 wks 5-8
- subj 55 wks 1-4
- subj 55 wks 5-8
- Subj 56 wks 1-4
- subj 56 wks 5-6
- SUBJ 57\_WK1\_4
- subj 58 wks 1-4
- Subj 59 Wks 1-4
- subj 59 wks 5-8
- Subj 60 wks 1-4
- Subj 60 wks 5-7
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  - subj 60 wks 5-7 nap
  - subj 60 wks 5-7\_check
- subj 62\_WK1\_4
- subj 62\_WK5\_8
- SUBJ 66\_WK1\_4
- subj 66\_wk5\_8
- subj 67 wks 1-4



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On: 6:00 AM  
Off: 8:00 PM

All Light  
 All Dark

**Interval Legend**

- Rest (R)
- Custom (C)
- Excluded (E)
- Forced Wake (W)
- Forced Sleep (S)
- Sleep (Info)

To set an interval:  
1. Left click on an Actogram to place epoch label.  
2. Right-click or use keyboard controls to set intervals.

# Polysomnography

- **EEG - Electroencepalogram**
- **EOG - Electro-oculogram**
- **EMG – Electromyogram**

**Can add measures of breathing and measures of leg movements to diagnose disorders**

# Ambulatory PSG



# Inpatient PSG



# EEG basics

- Allow human sleep to be broken down further
- Stage 0 – wakefulness (EEG: low voltage, fast) moving to higher frequency alpha waves when drowsy

Awake - low voltage - random, fast



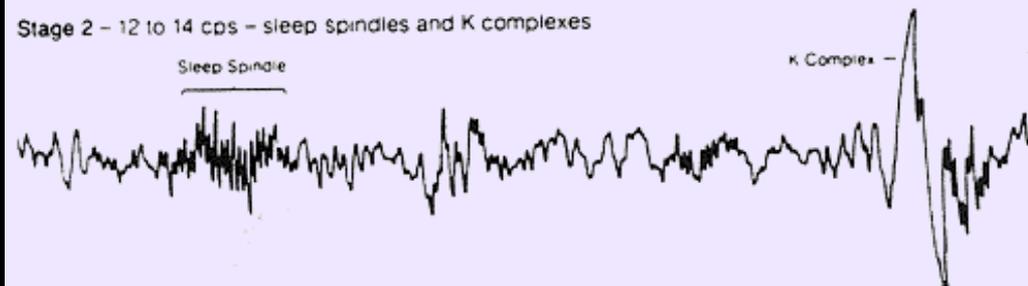
Drowsy - 8 to 12 cps - alpha waves



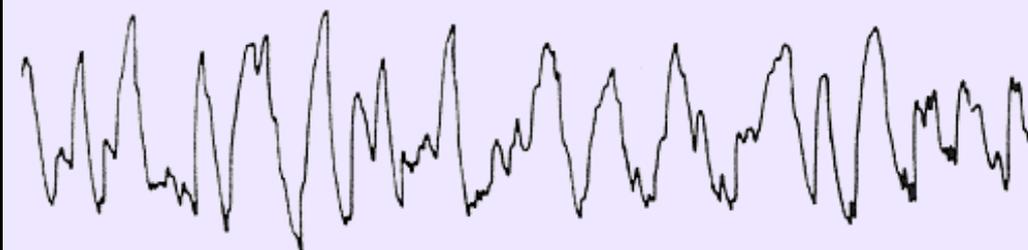
Stage 1 - 3 to 7 cps - theta waves



Stage 2 - 12 to 14 cps - sleep spindles and K complexes



Delta Sleep - 1/2 to 2 cps - delta waves >75  $\mu$ V



REM Sleep - low voltage - random, fast with sawtooth waves



# EEG basics

- Allow human sleep to be broken down further
- Stage 0 – wakefulness (EEG: low voltage, fast)

## Non-Rapid Eye Movement Sleep

- N1 – transitional phase, 5% of the night (EEG: low voltage, mixed frequency, EOG: slow rolling eye movements)
- N2 – true onset of sleep, 45% of the night (EEG: sleep spindles)

Awake - low voltage - random, fast



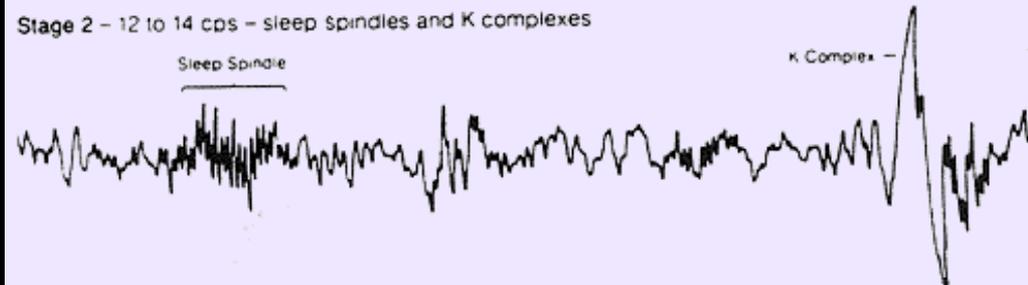
Drowsy - 8 to 12 cps - alpha waves



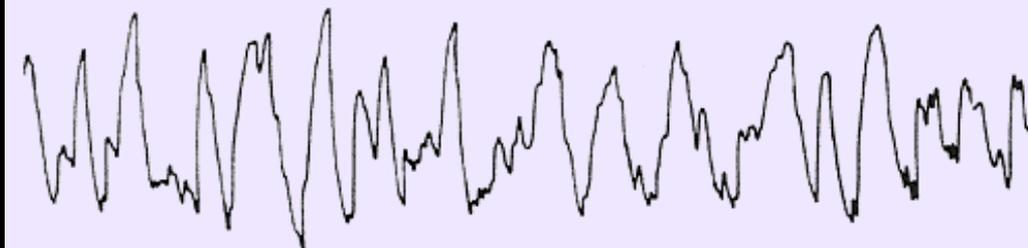
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Delta Sleep - 1/2 to 2 cps - delta waves >75  $\mu$ V



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## Non-Rapid Eye Movement Sleep

- N1 – transitional phase, 5% of the night (EEG: low voltage, mixed frequency, EOG: slow rolling eye movements)
- N2 – true onset of sleep, 45% of the night (EEG: sleep spindles)
- N3 – deepest stage (known as slow wave sleep or ‘delta sleep’) (EEG: high amplitude, slow)

Awake - low voltage - random, fast



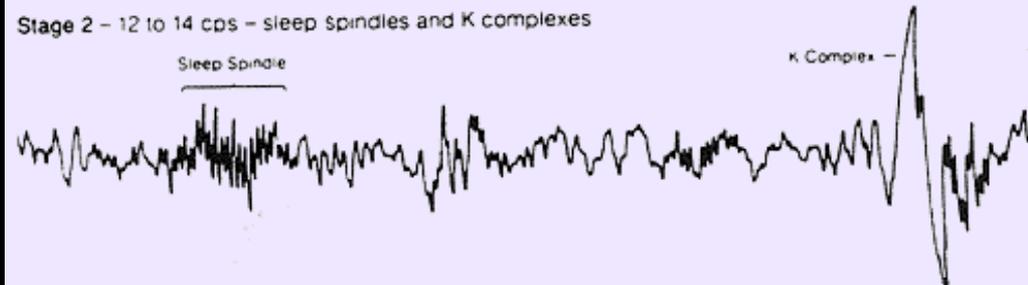
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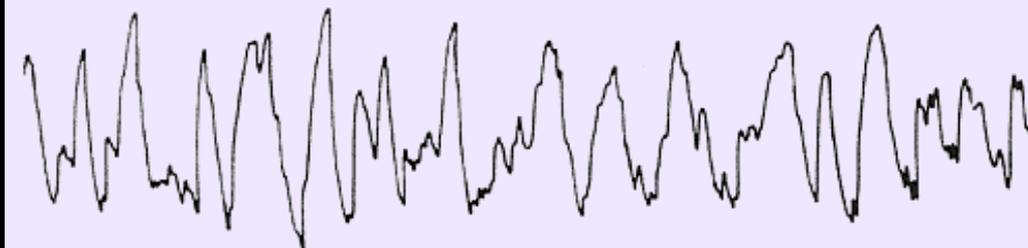
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Stage 2 - 12 to 14 cps - sleep spindles and K complexes



Delta Sleep - 1/2 to 2 cps - delta waves >75  $\mu$ V



REM Sleep - low voltage - random, fast with sawtooth waves



# EEG

- Allow human sleep to be broken
- Stage 0 – wakefulness (EEG: low

## Non-Rapid Eye Movement Sleep

- N1 – transitional phase, 5% of the night (EEG: low frequency, EOG: slow rolling eye movements)
- N2 – true onset of sleep, 45% of the night (EEG: sleep spindles)
- N3 – deepest stages (together known as slow wave sleep; SWS or sometimes as ‘delta sleep’) (EEG: high amplitude, slow)

## Rapid Eye Movement Sleep

- Bursts of rapid eye movements. Most dreams.
- EEG: low voltage, mixed frequency (similar to Stage 1)



Awake - low voltage - random, fast



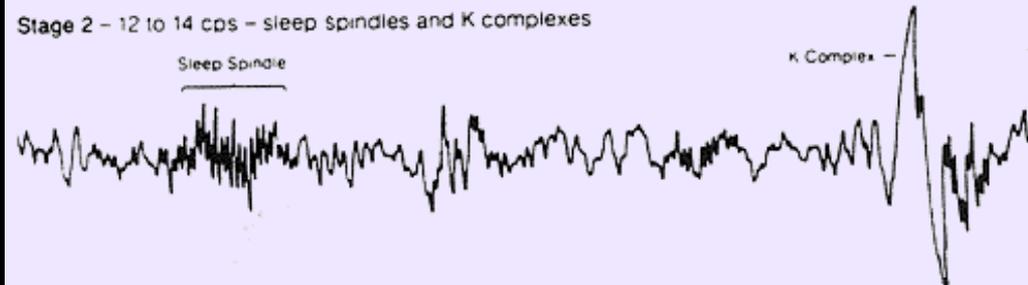
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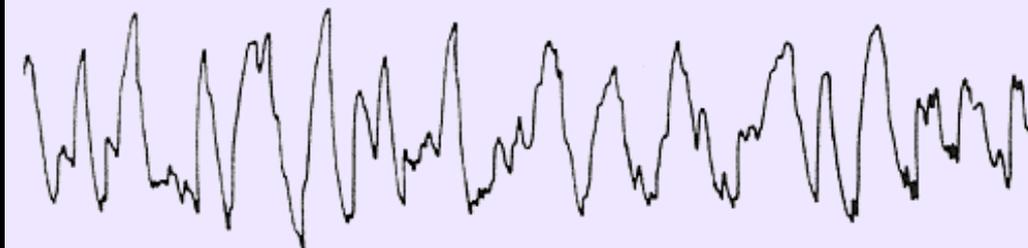
Stage 1 - 3 to 7 cps - theta waves



Stage 2 - 12 to 14 cps - sleep spindles and K complexes



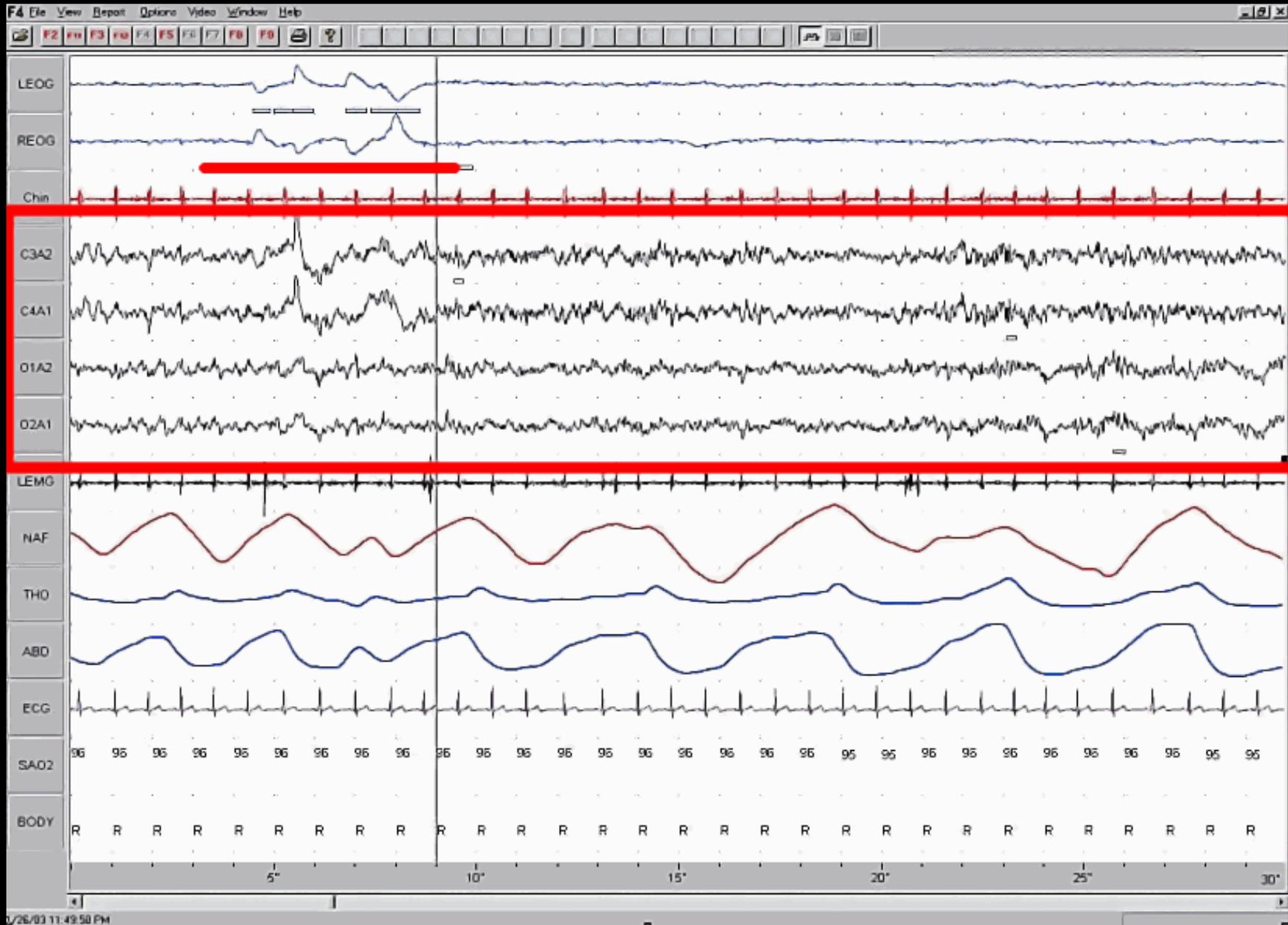
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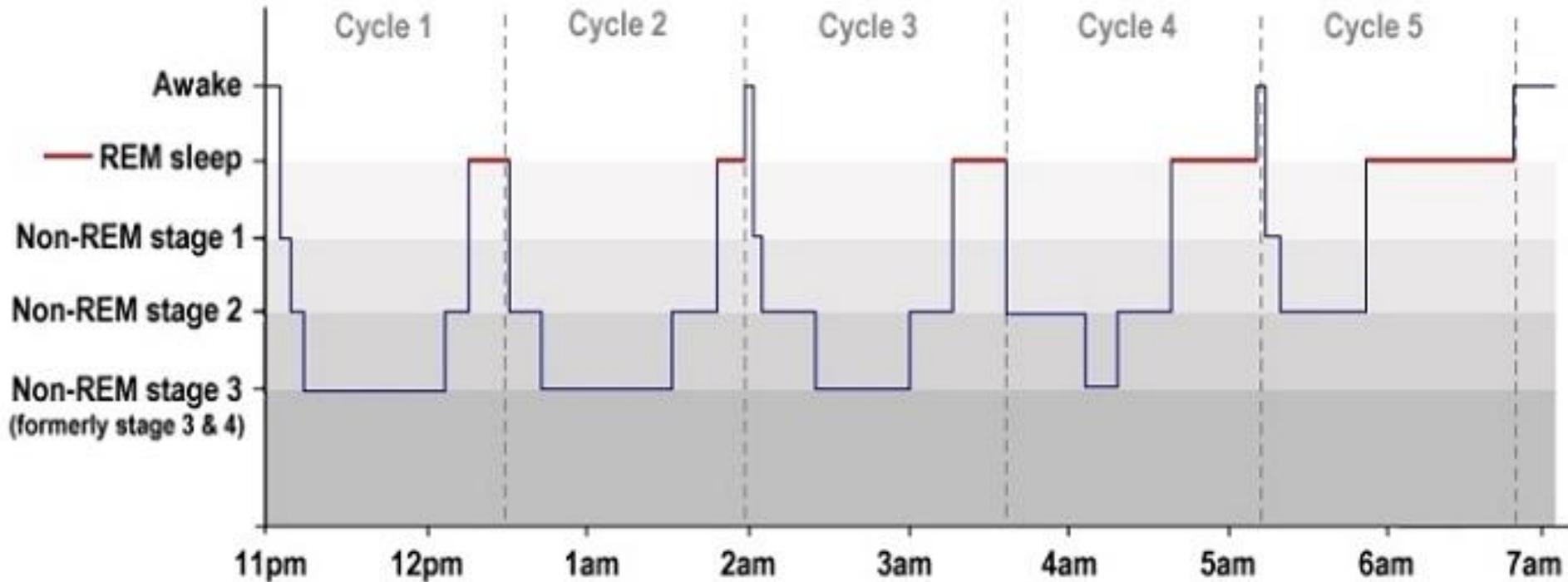
REM Sleep - low voltage - random, fast with sawtooth waves

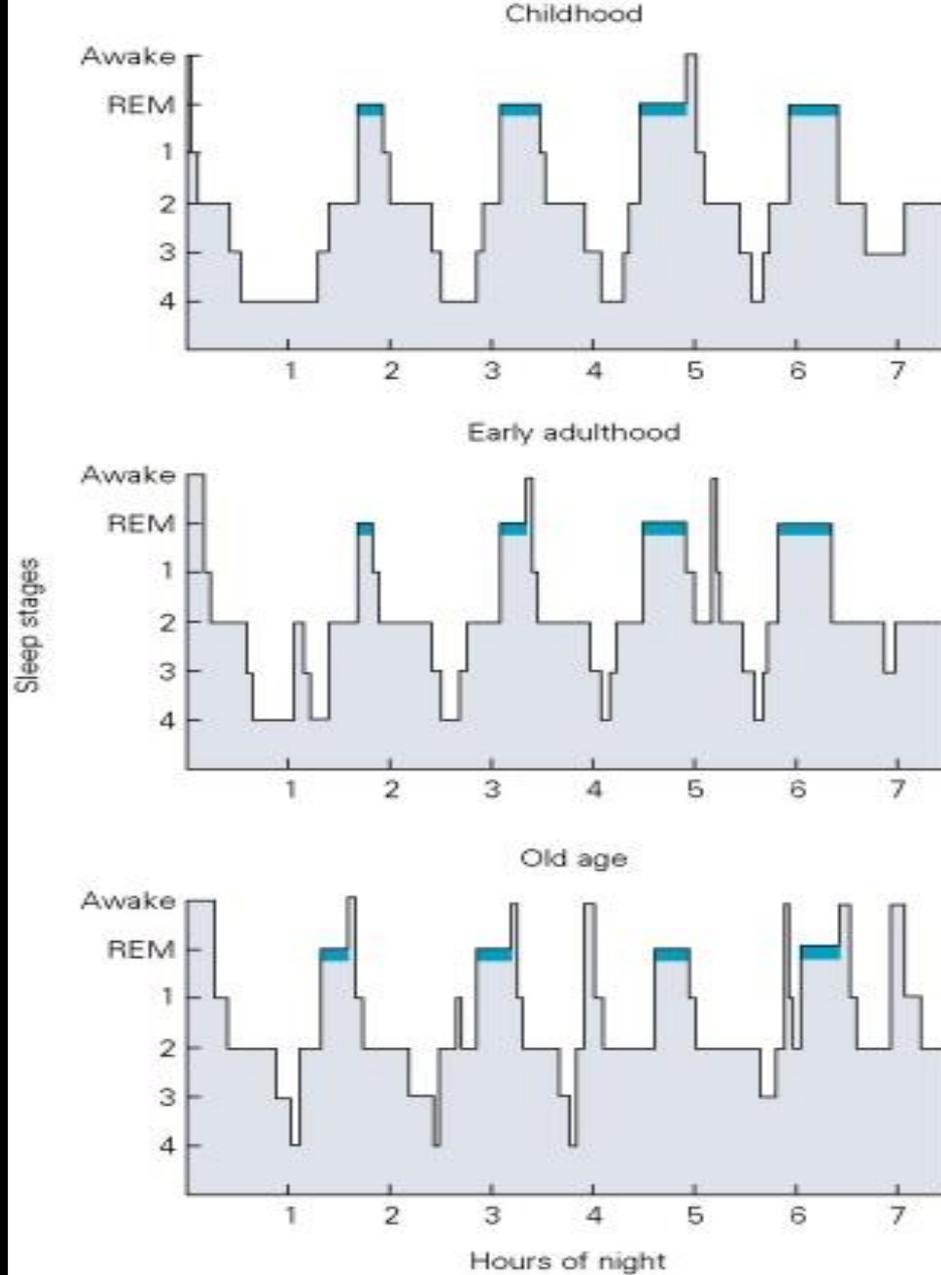






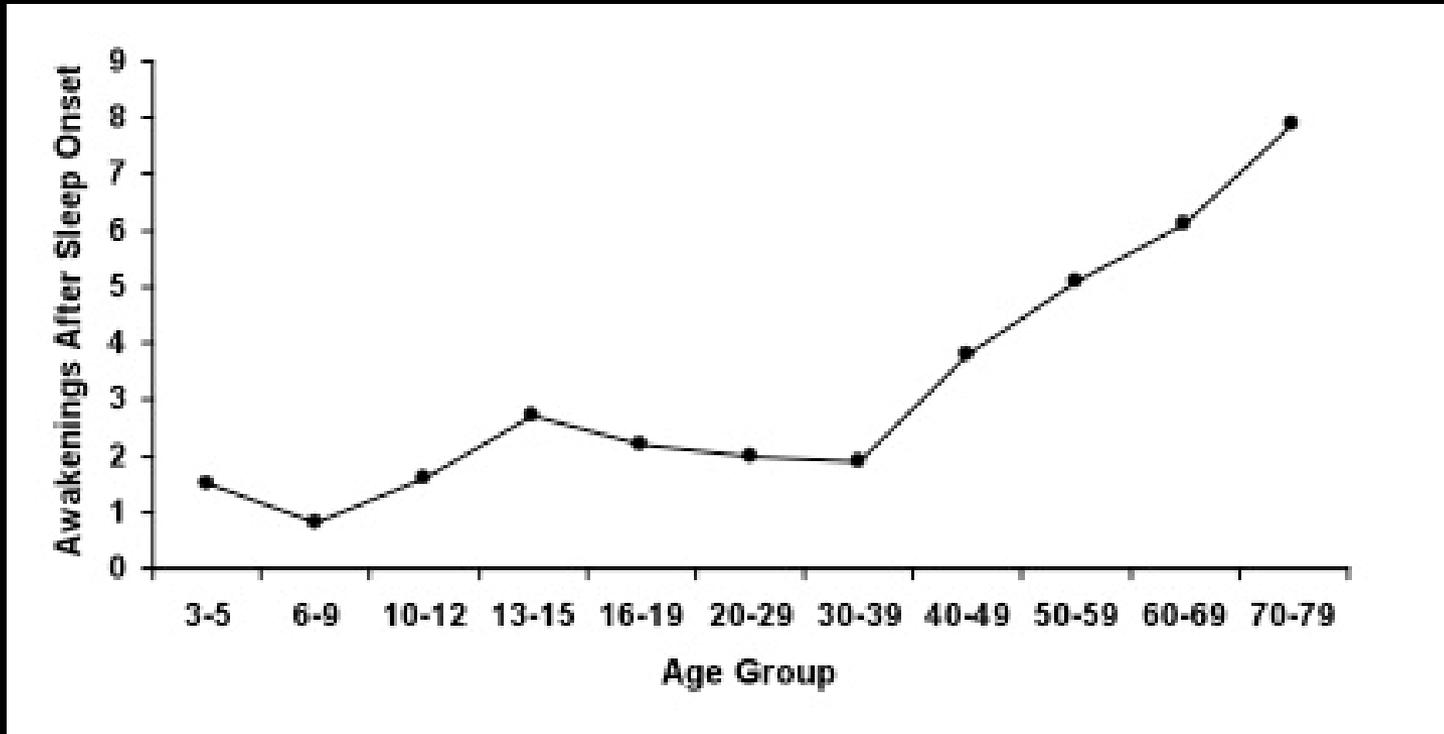
# A Typical Night of Sleep in a Teen





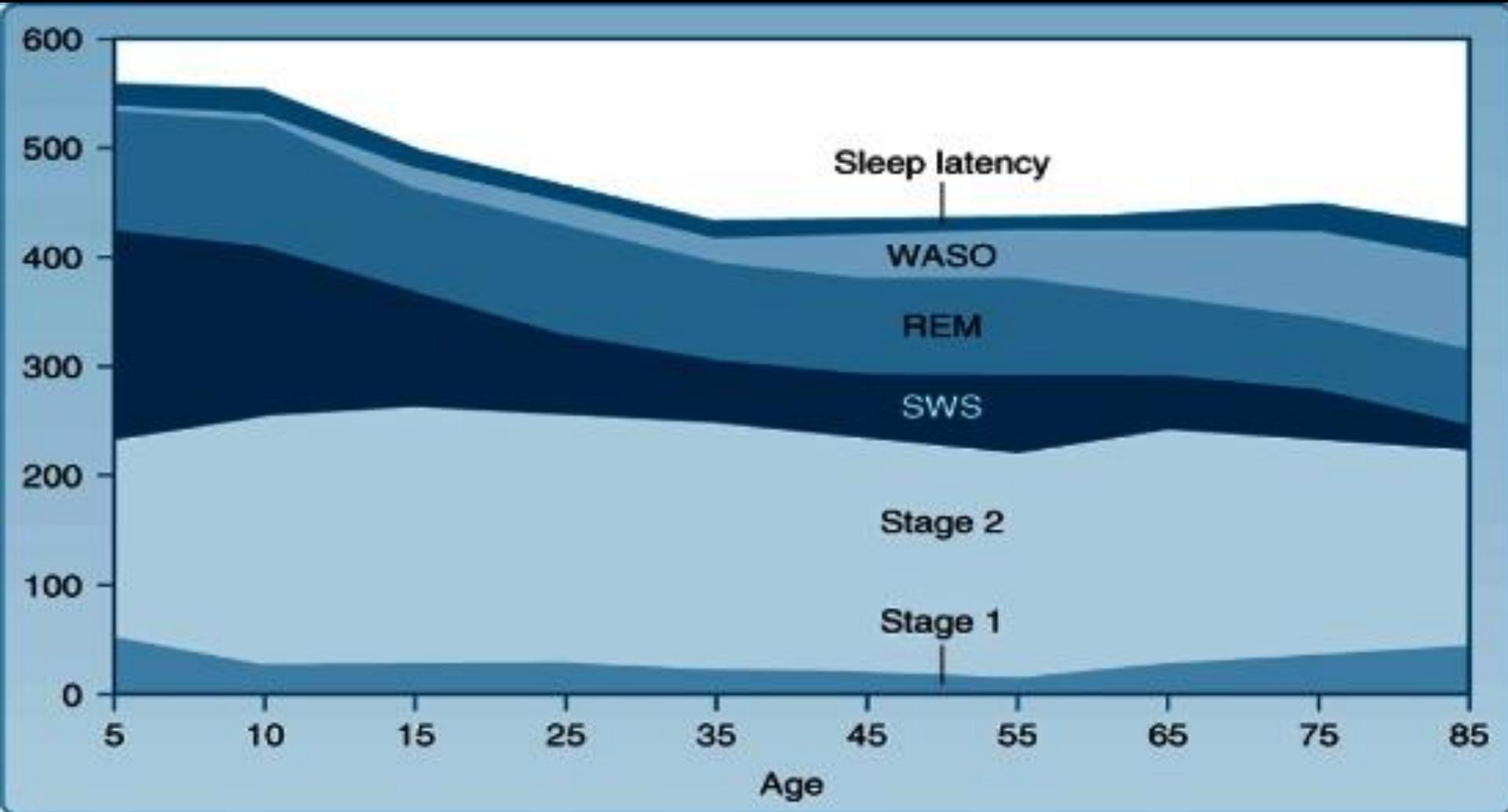
What changes do you notice?

# A Typical Night of Sleep



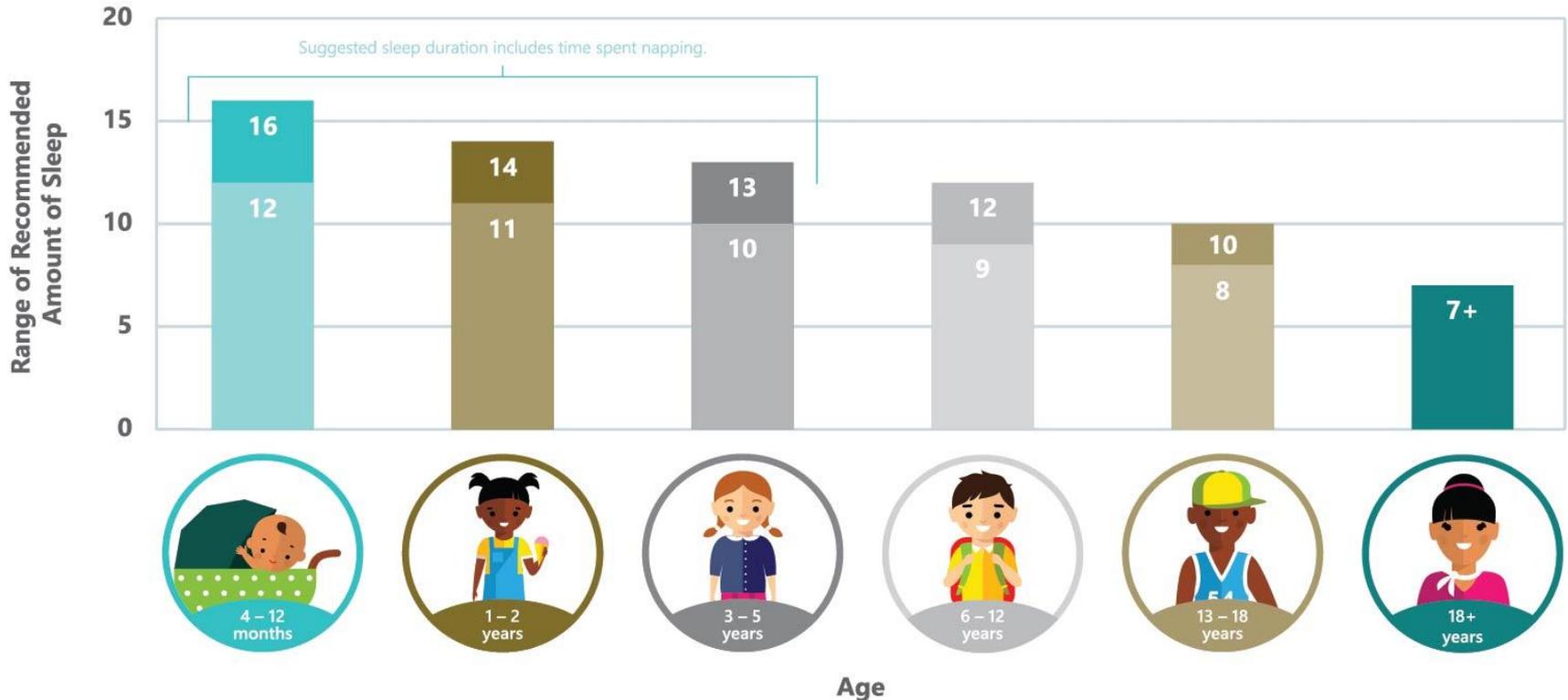
Awakenings are a normal part of nighttime sleep, increase as we age

# Sleep Changes Across Adulthood



# Healthy Sleep Duration

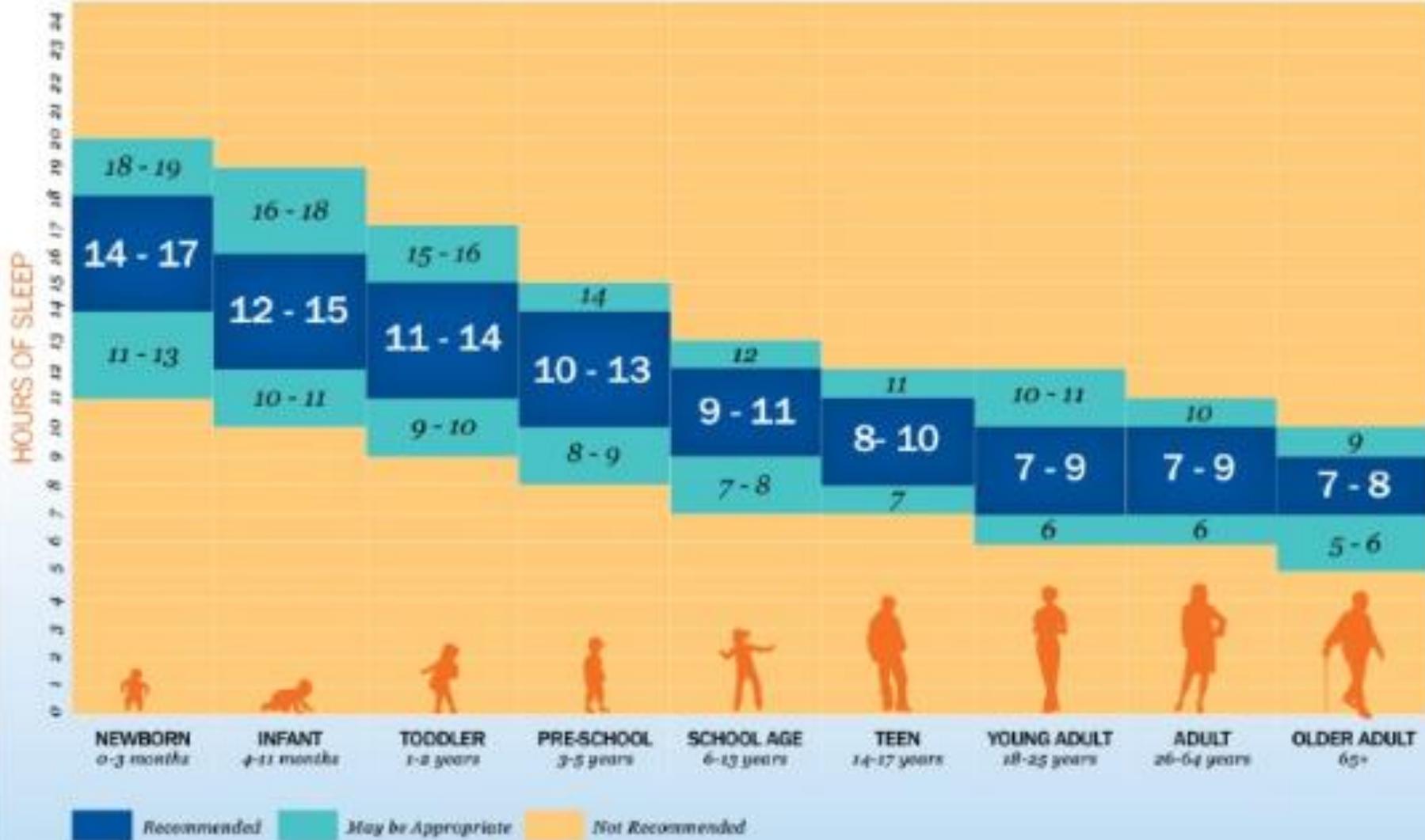
The American Academy of Sleep Medicine recommends that you get the following hours of sleep on a regular basis for optimal health at each stage of life.



[SleepEducation.org](https://www.sleepeducation.org)

A sleep health information  
resource by the American  
Academy of Sleep Medicine





**SLEEPFOUNDATION.ORG | SLEEP.ORG**

Minshkowitz M. The National Sleep Foundation's sleep time duration recommendations: methodology and results summary. *Sleep Health* (2015), <http://dx.doi.org/10.1016/j.sleh.2014.12.010>

# Sleep Physiology is Disrupted in Psychopathology

- Depression: Increased REM latency and density
- PTSD: Increased aminergic tone
- Mania: 'Reduced sleep need'
- Substance use: Abnormalities in architecture

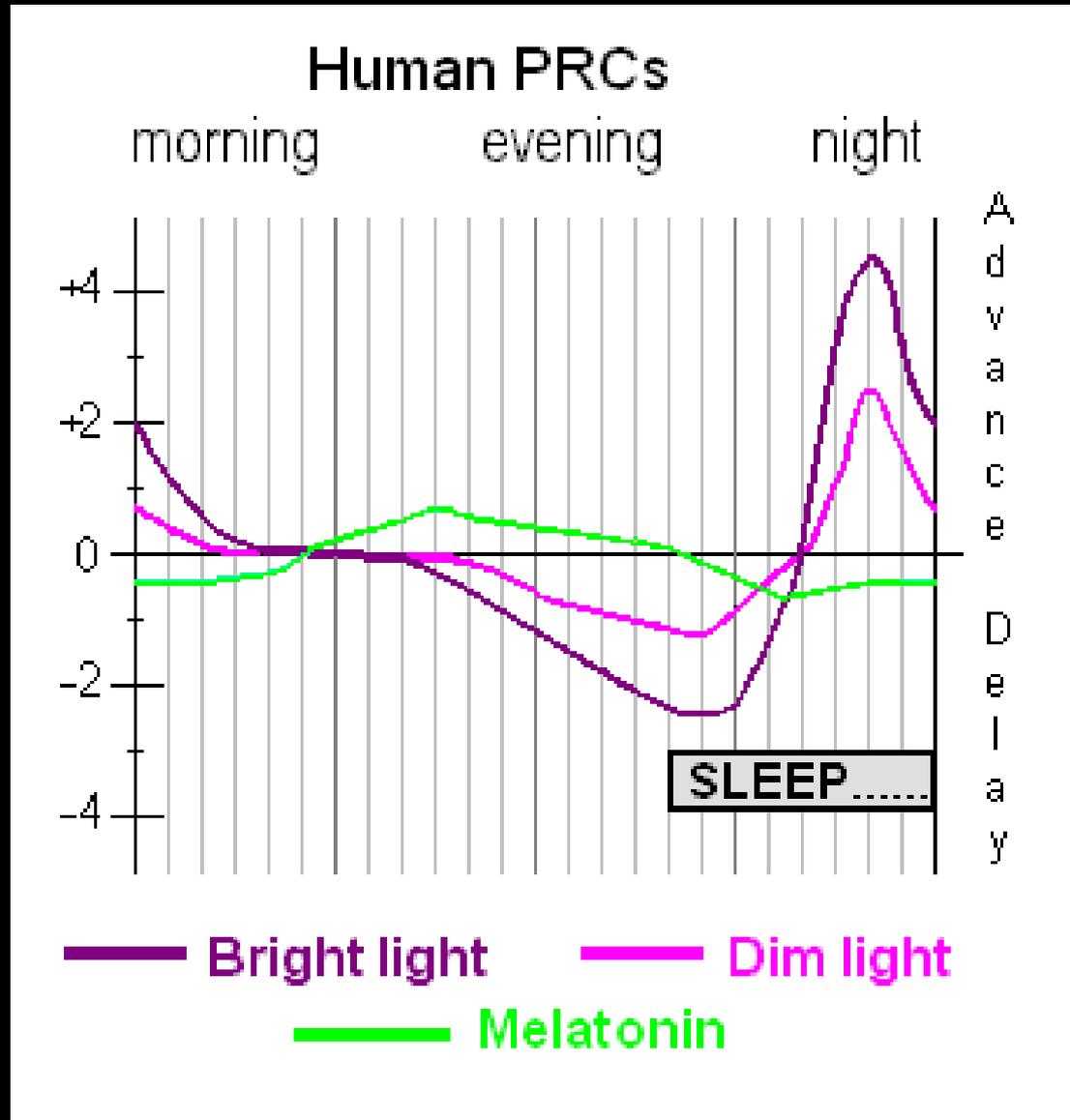
...and on and on

# Workshop Agenda

- 9:00-9:30 The importance of sleep, sleep health and the intersection of sleep and psychology
- 9:30-10:00 Introduction to sleep physiology and sleep across the lifespan
- **10:00-10:30** **Light, caffeine, electronics, and other 'sleep stealers'**
- 10:30-10:45 Break
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# Phase Response Curve to Light



# Is Light from Electronics Ruining My Sleep?



Tech » Gadgets | Cyber Security | Innovation Nation

Part of complete coverage on  
**Living with Technology**



EDITION  
US

THE HUFFINGTON POST  
INFORM • INSPIRE • ENTERTAIN • EMPOWER

NEWS

POLITICS

ENTERTAINMENT

WELLNESS

WHAT'S WORKING

VOICES

VIDEO

SLEEP+WELLNESS IN PARTNERSHIP WITH sleep  number.

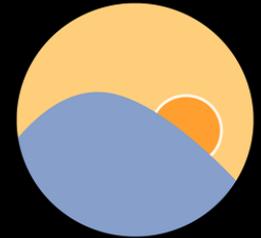
## Evening use of light-emitting eReaders negatively affects sleep, circadian timing, and next-morning alertness

Anne-Marie Chang<sup>a,b,1,2</sup>, Daniel Aeschbach<sup>a,b,c</sup>, Jeanne F. Duffy<sup>a,b</sup>, and Charles A. Czeisler<sup>a,b</sup>

<sup>a</sup>Division of Sleep and Circadian Disorders, Departments of Medicine and Neurology, Brigham and Women's Hospital, Boston, MA 02115; <sup>b</sup>Division of Sleep Medicine, Harvard Medical School, Boston, MA 02115; and <sup>c</sup>Institute of Aerospace Medicine, German Aerospace Center, 51147 Cologne, Germany

PNAS

# Light Exposure is *Relative*



Light Exposure is *Important*

# Caffeine

- Long half life (3-7h, up to 24h in older adults)
- Hidden sources of caffeine (soda, chocolate, ice cream, wellness drinks)
- Recommendation is to suspend caffeine use by 2pm

# BONUS: Kate's Jet Lag Plan (Eastbound Flights)

## BEFORE YOU LEAVE:

- Wake up one hour earlier on three mornings prior to departure (6a, 5a, 4a)
- Take melatonin 0.5mg 4-5 hours before target bedtime

## ON THE PLANE:

- Eat meals in accordance with new time zone
- Wear a hat and sunglasses / blue blocking goggles on the plane and upon landing; don't remove until 3a PT

## ON ARRIVAL:

- Get LOTS of sunlight beginning 11a or noon
- Take 0.5mg melatonin at bedtime for the next few nights

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# Sleep Scenario 1: The Sleepy Teen



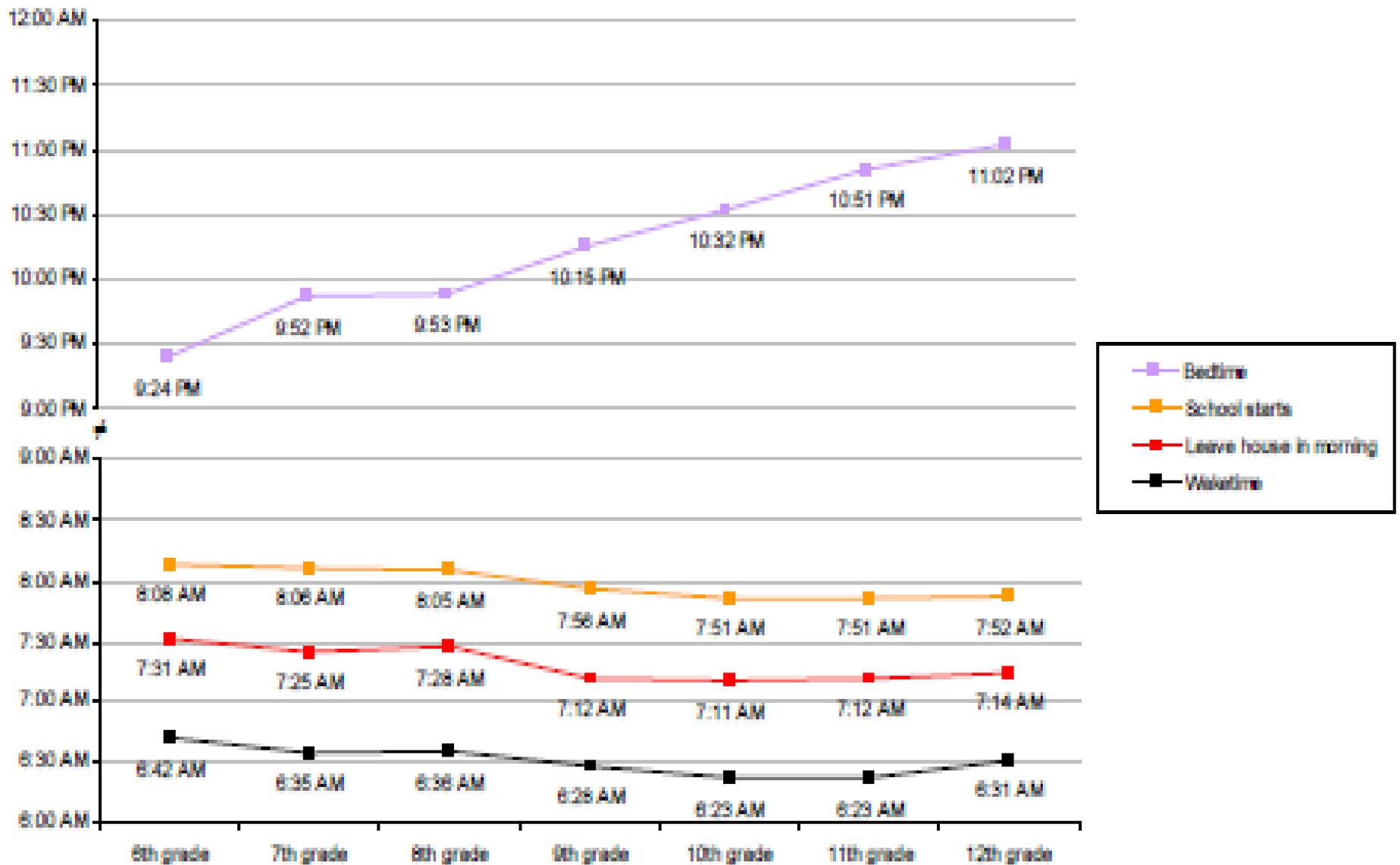
# Sleep Scenario 1: The Sleepy Teen

Kayla is a 16-year-old sophomore struggling with her sleep. She wakes up for school at 6:30am feeling exhausted and snoozes her alarm multiple times. Often her parents have to come in to wake her repeatedly, resulting in fighting and morning discord. She falls asleep in her first period class routinely.

After school and soccer practice, Kayla often feels so tired she takes a 1-2 hour nap. Dinner, homework and internet/phone use make up the remainder of her evening. Kayla feels most alert in the evening and doesn't attempt to sleep until 12-1am, because she knows she won't be able to fall asleep earlier. On weekends Kayla sleeps in until 11am in an attempt to make up for the weekday sleep loss, and goes to bed around 2am.

How can we help Kayla?

Adolescent's Typical School Day (Average)



# The Late Night Calling

A survey done nearly 10 years ago asking young adults what activities they engaged in within an hour of going to bed on school nights...this is what they found:

- Watching television (76%)
- Studying or doing homework (70%)
- Going on the internet or instant messaging (54%)
- Talking on the telephone (50%)
- Reading for fun (35%)
- Exercising (32%)
- Playing electronic or video games (24%)

# The Late Night Calling

The same survey was done in 2014 and they found:

- 33% of teens sleep with the TV on
- 89% of teens have at least one electronic device in their bedroom
- 16% of teens reported sending text messages or emails *after going to sleep*
- 1 in 10 teens is woken up from a call or text *almost every night*

## Consequences of Using Electronics at Night:

- Much more likely to fall asleep at school
- Harder time waking up in the morning
- More difficulties falling asleep at night





# Are teens sleep-deprived?

- Need for sleep remains constant, about 9 hrs  
(Carskadon & Acebo, 2002)
- Average teen gets 7.5 hrs of sleep per night  
(National Sleep Foundation, 2006)
  - Ranges from 8.4 hrs for 6<sup>th</sup> grade to 6.9 hrs for 12<sup>th</sup> grade
- Percentage of teens getting <7 hrs of sleep increases with age
  - 57.7% in 9<sup>th</sup> grade versus 78.2% for 12<sup>th</sup> grade (Eaton et al., 2010)

# Why are teens sleep-deprived?

- Psychosocial factors
  - Decreased parental monitoring
  - Academic demands
  - Other activities: social, extracurricular, employment

# Why are teens sleep-deprived?

## School start times

- Wolfson et al., 2007: middle school start times study
  - 2 schools: early-starting (7.15 am) and late-starting (8.37 am)
  - Sample of 205 7<sup>th</sup> and 8<sup>th</sup> graders
  - Compared sleep habits between both groups

TABLE 2  
Means and Standard Deviations for School-Night Sleep–Wake Patterns

Variable	School E				School L			
	Fall		Spring		Fall		Spring	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Bedtime <sup>*a</sup>	9:19	0:38	9:47	1:00	9:41	0:56	9:53	0:57
Wake time <sup>***a,b</sup>	5:44	0:25	5:53	0:22	6:59	0:33	7:00	0:39
Total sleep time (min) <sup>***a,b</sup>	497	75	470	78	534	78	535	76
Departure time <sup>***a,b</sup>	6:46	0:22	6:46	0:16	8:09	0:16	8:11	0:20

<sup>a</sup>Fall <sup>b</sup>Spring.

<sup>\*</sup>  $p < .05$ , school effect.

<sup>\*\*</sup>  $p < .001$ , school effect.

# Why are teens sleep-deprived?

- Biological factors
  - 40% decrease in SWS—sleep pressure takes longer to accumulate (Carskadon & Acebo, 2002)
  - Onset of puberty triggers a preference for eveningness (Carskadon et al., 1993)



# Correlates of insufficient sleep

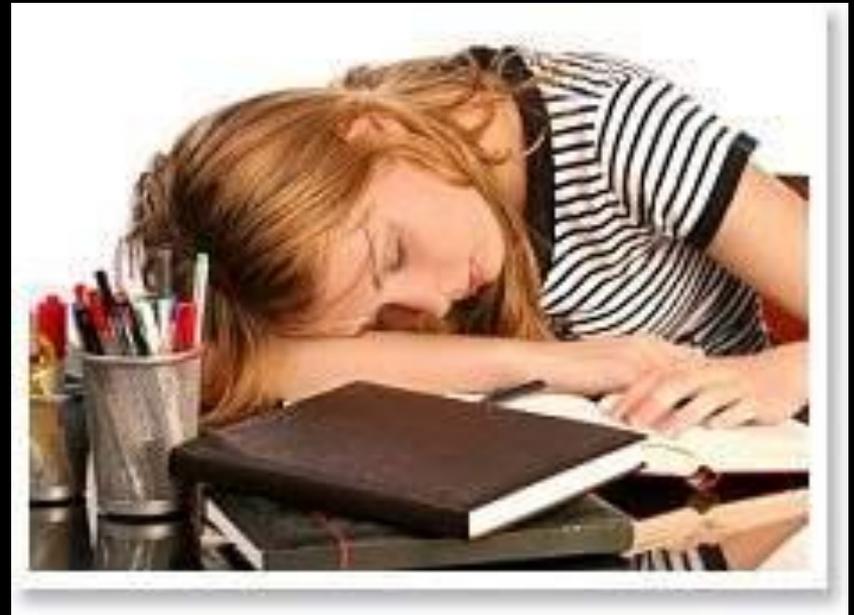
- Behavioral
  - Daytime sleepiness (National Sleep Foundation, 2006)
    - 50 % teens report feeling too tired/sleepy
    - Over 20% teens report falling asleep in school/while doing HW at least 1x/wk
  - More caffeine consumption (National Sleep Foundation, 2006)
  - Greater likelihood of non-alcoholic drug use (Roberts et al., 2009)

# Correlates of insufficient sleep

- Psychosocial
  - Lower self-esteem & life satisfaction, more interpersonal problems, decreased sense of control
  - Sleep disturbance in clinically depression or anxious teens
  - More depressive symptoms in non-clinical populations
    - Longitudinal study showed that reduced sleep predicted depressive symptoms (Roberts et al., 2009)

# Correlates of insufficient sleep

- Academic
  - Lower grades—perhaps related to behavioral and psychosocial correlates of insufficient sleep?



# Putting it All Together: Using Science to Improve Sleep

- Behavioral interventions
- Homeostatic Interventions
- Circadian Interventions



# Behavioral

- Encourage electronics curfew one hour before bed
- Silence cell phones and keep chargers outside of the bedroom
- Establish a good wind-down routine
- Avoid exercise 1-2h before bed



# Homeostatic

- Limit caffeine use after 12pm – beware of chocolate, soda, energy drinks and “hidden” sources of caffeine
- Keep naps (if any) under 30 minutes
- If falling asleep is a problem, avoid naps altogether
- Encourage regular exercise



# Circadian

- *Don't vary risetimes by more than 2 hours weekdays to weekends*
- Get plenty of sunlight exposure in the morning
- Be wary of light exposure at night (overhead lighting, laptops and iPads).
- Consider purchasing orange safety goggles that block circadian-delaying blue wavelength light
- Download f.lux
- Be cautious about melatonin



# Sleep Scenario 1: The Sleepy Teen

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How can we help Kayla?

# Sleep Scenario 2: The Young Adult with Nightmares



# Sleep Scenario 2: The Young Adult with Nightmares

Carlos is a 25-year-old single male with recurrent nightmares. Three years ago Carlos was involved in a motor vehicle accident and sustained multiple injuries. Carlos now reports multiple symptoms of PTSD, including distressing nightmares.

Carlos has 1-3 nightmares per night, often involving car accidents but also sustaining other injuries (e.g. gunshot wounds, falling). He avoids going to bed until very late and often sleeps on his couch or other areas of his house. Sometimes he will medicate with alcohol, Nyquil or Benadryl. He regularly naps in the daytime. Carlos reports hating feeling vulnerable while he is asleep and tries to avoid sleep at all costs.

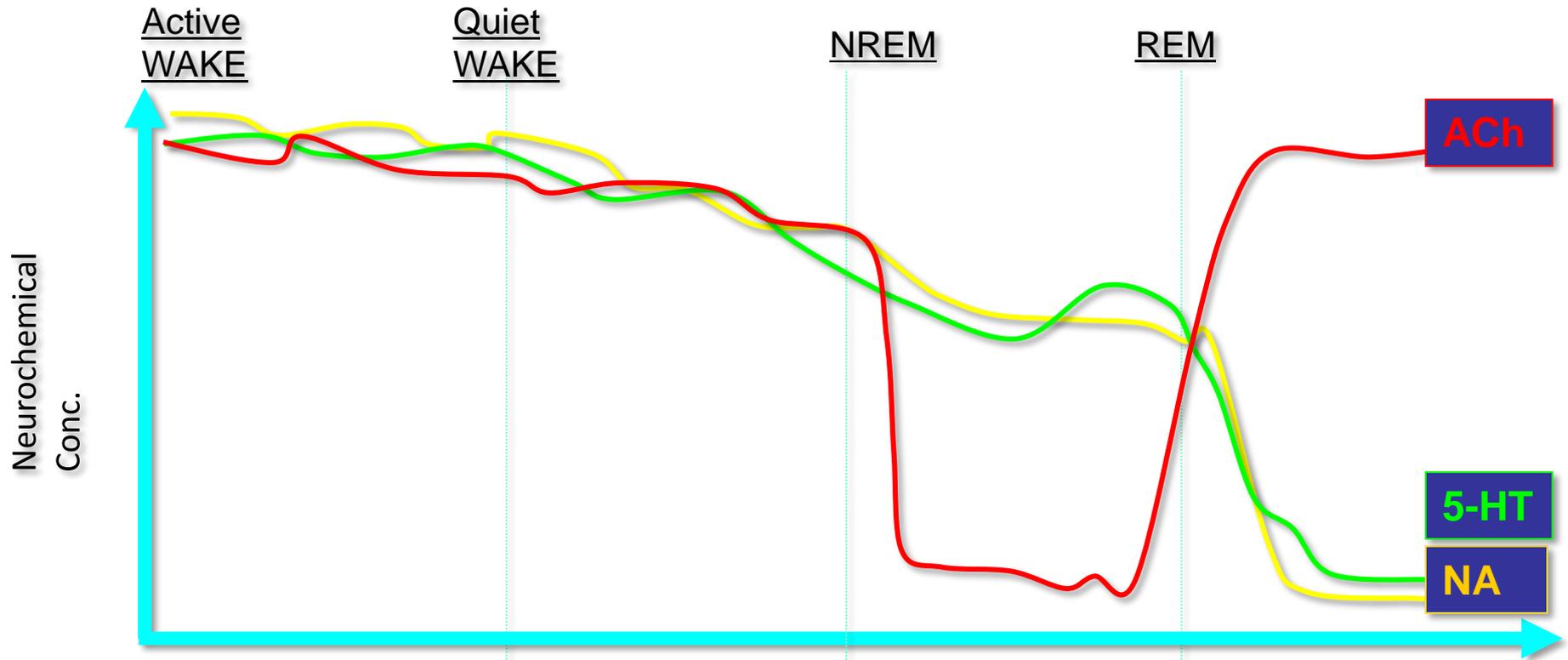
How can we help Carlos?

# Nightmares

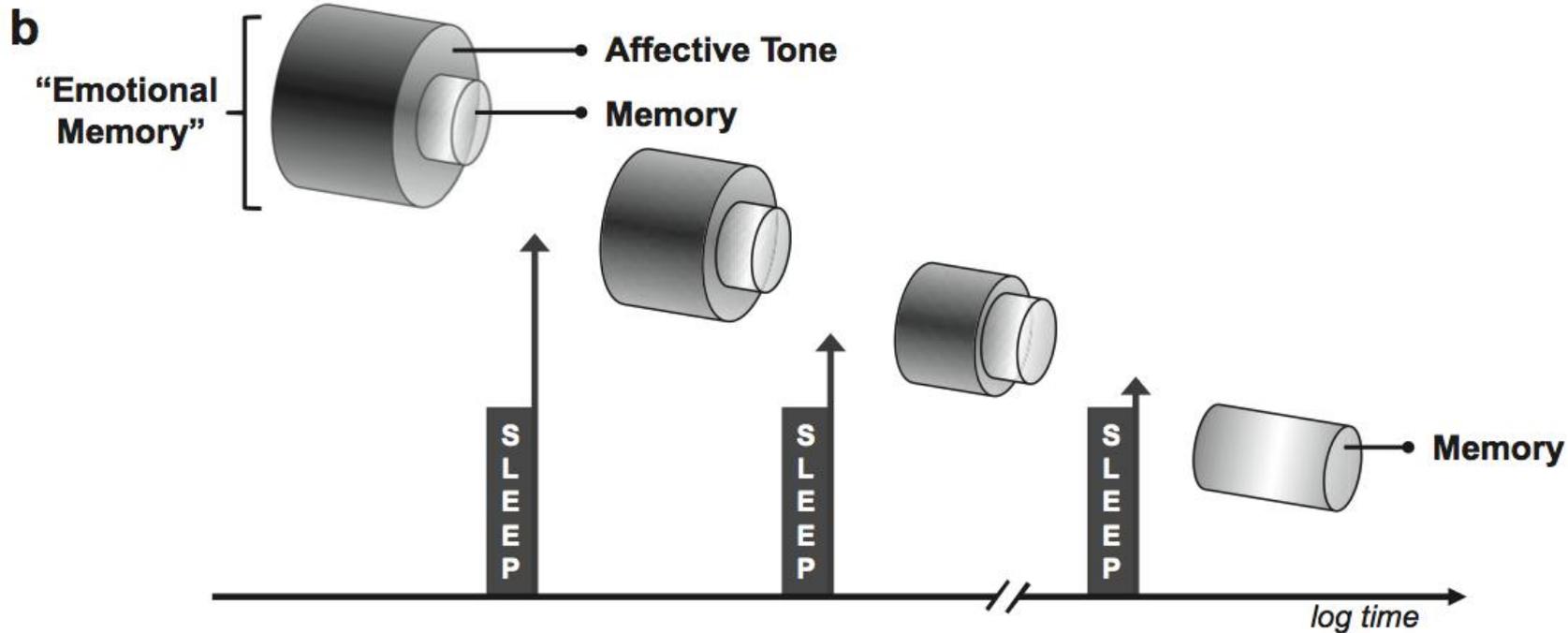


- The dreaming brain is an emotional brain
  - Increased limbic activity
  - Decreased DLPFC activity
- Repetitive nightmares are very much like a neural ‘habit’
- Neurochemical milieu may contribute

# Background



# Nightmares



# Nightmares



- Imagery Rehearsal Therapy
  - Seeing is believing
  - 5 session treatment, individual / group
  - Begin with psychoeducation and tracking
  - Practice imagery training
  - Rescript the nightmare
  - Practice rescripted nightmare training

# Nightmares



- Stimulus Control
  - Practice relaxing activities before bedtime
  - Only sleep in the bed, not elsewhere in house
  - Get out of bed immediately following a nightmare
  - Only return to bed when sleepy / relaxed again
  - Don't nap in the daytime

# Sleep Scenario 2: The Young Adult with Nightmares

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How can we help Carlos?

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# Sleep Scenario 3:

## The Adult Who Can't Sleep

Helen is a 43-year-old married mother of two struggling with chronic insomnia. Helen reports frequently waking up at 2am and will often remain awake for several hours, sometimes unable to fall back asleep at all. She remains in bed trying to clear her mind but often finds her thoughts turning to her wakefulness and fears for how exhausted she will be in the day following.

To cope with her insomnia, Helen will sleep slightly later following a bad night (7am instead of 6am). She sometimes calls in sick to work or, if she does go to work, she will fill her day with mundane tasks and avoid challenging ones. Helen wishes she could take a nap but often feels too anxious to do so.

Helen avoids anything that might wake her up in the middle of the night – e.g. distressing television shows, drinking liquid after 7pm. She has also started sleeping in a separate room from her husband, fearing he might contribute to the problem, and now occupies the guest room in their home. Helen has tried multiple sleep medications, each of which has lost effectiveness over time. She currently takes temazepam 15mg QHS.

How can we help Helen?

# Definition of Insomnia Disorder

- Difficulty initiating, maintaining or re-initiating sleep
- 3x/wk for at least 3 months
- Adequate opportunity to sleep
- Not due to another sleep disorder or the effects of a substance
- Clinically significant distress or impairment
- No more Primary vs Secondary Insomnia

# Significance of Insomnia

- Prevalence: 10% chronic insomnia, 15-20% shorter-term insomnia disorder
- Societal Impact
  - nearly **60B** in annual lost productivity due to insomnia
  - Significantly associated with workplace accidents and errors
  - Reduced quality of life

# Significance of Insomnia

- Insomnia predicts first-onset and recurrence of psychological disorders
- Insomnia is related to suicide completion
- Very preliminary evidence that insomnia treatment (CBTI) reduces suicidal ideation

## EFFECTS OF CBT FOR INSOMNIA ON SUICIDAL IDEATION IN VETERANS

### Effects of Cognitive Behavioral Therapy for Insomnia on Suicidal Ideation in Veterans

Mickey Trockel, MD, PhD<sup>1,2,\*</sup>; Bradley E. Karlin, PhD, ABPP<sup>3,4,5,\*</sup>; C. Barr Taylor, MD<sup>2</sup>; Gregory K. Brown, PhD<sup>6,7</sup>; Rachel Manber, PhD<sup>1,2</sup>

# FIGURE

## A MODEL OF CHRONIC INSOMNIA<sup>2-4</sup>

### Predisposing Factors

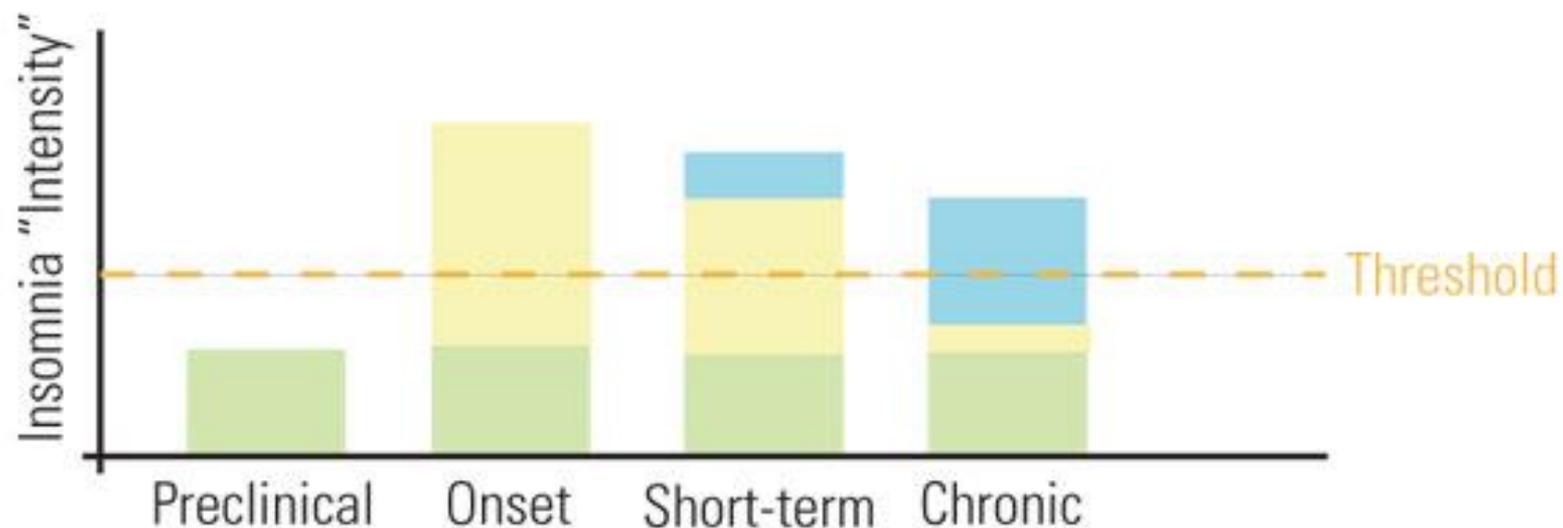
- Biologic traits
- Psychological traits
- Social factors

### Precipitating Factors

- Medical illness
- Psychiatric illness
- Stressful life events

### Perpetuating Factors

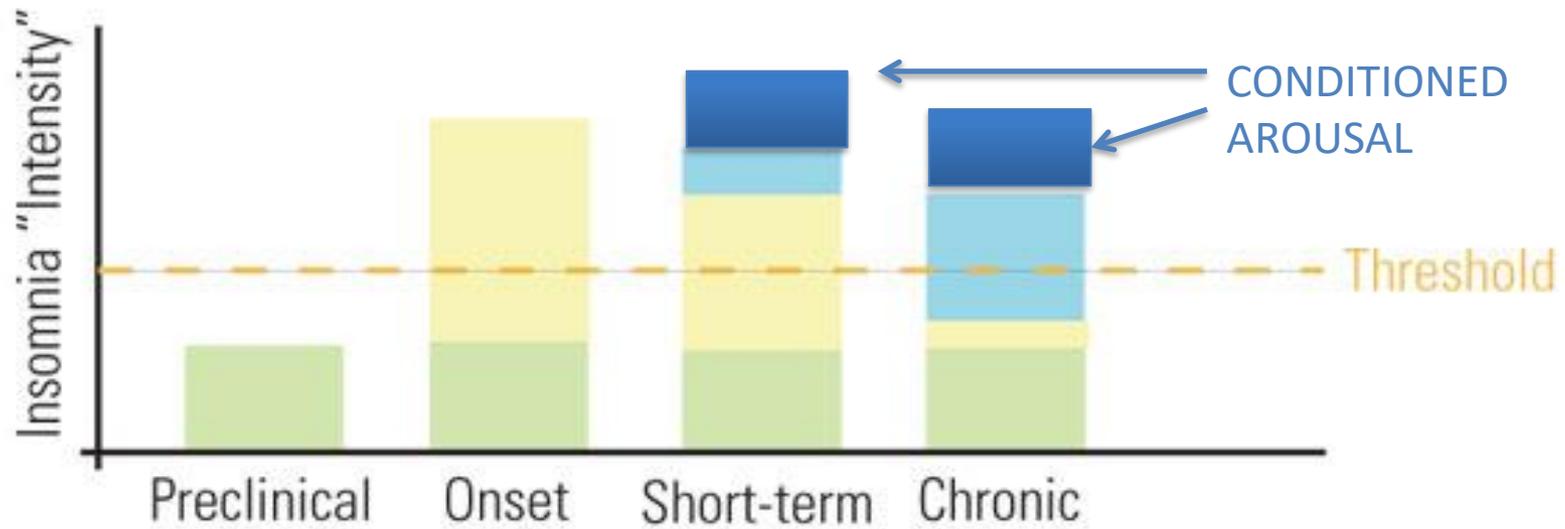
- Excessive time in bed
- Napping
- Conditioning



# FIGURE

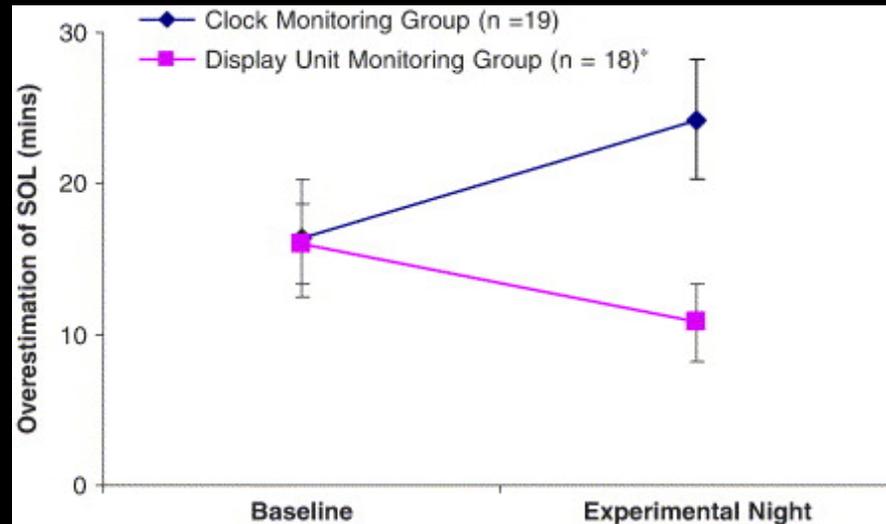
## A MODEL OF CHRONIC INSOMNIA<sup>2-4</sup>

- |   |  |  |
|---|--|--|
| <b>Predisposing Factors</b> <ul style="list-style-type: none"><li>• Biologic traits</li><li>• Psychological traits</li><li>• Social factors</li></ul> | <b>Precipitating Factors</b> <ul style="list-style-type: none"><li>• Medical illness</li><li>• Psychiatric illness</li><li>• Stressful life events</li></ul> | <b>Perpetuating Factors</b> <ul style="list-style-type: none"><li>• Excessive time in bed</li><li>• Napping</li><li>• Conditioning</li></ul> |
|---|--|--|



# Theories of Insomnia 2: The Cognitive Model

- Insomnia results from excessive worry about poor sleep and its daytime effects
- People develop 'safety behaviors' to mitigate sleep-related anxiety



# Theories of Insomnia 3: Psychobiological Inhibition Model

- People with insomnia selectively attend to threatening stimuli and have difficulty disengaging from threatening stimuli

RED GREEN BLUE RED BLUE			
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Espie et al., 2006; Taylor et al., 2003; Spiegelhalder et al., 2008

# Theories of Insomnia 3: Psychobiological Inhibition Model

- People with insomnia selectively attend to threatening stimuli and have difficulty disengaging from threatening stimuli

RED	XXX		
GREEN	XXX		
BLUE	XXX		
RED	XXX		
BLUE	XXX		

Espie et al., 2006; Taylor et al., 2003; Spiegelhalder et al., 2008

# Theories of Insomnia 3: Psychobiological Inhibition Model

- People with insomnia selectively attend to threatening stimuli and have difficulty disengaging from threatening stimuli

RED	XXX	RED	
GREEN	XXX	GREEN	
BLUE	XXX	BLUE	
RED	XXX	RED	
BLUE	XXX	BLUE	

Espie et al., 2006; Taylor et al., 2003; Spiegelhalder et al., 2008

# Theories of Insomnia 3: Psychobiological Inhibition Model

- People with insomnia selectively attend to threatening stimuli and have difficulty disengaging from threatening stimuli

RED	XXX	RED	COURAGE
GREEN	XXX	GREEN	SHEETS
BLUE	XXX	BLUE	GOOD
RED	XXX	RED	NAP
BLUE	XXX	BLUE	RESTLESS

Espie et al., 2006; Taylor et al., 2003; Spiegelhalter et al., 2008

# Theories of Insomnia 4: Neurobiological and Neurocognitive Models

- PSG-determined sleep in insomnia **isn't that bad** compared to self report

PSG Variable	Group 1 - ??	Group 2 - ??
Time to Fall Asleep	16.3	26.4
Wakefulness at Night	25.9	28.6
Total Sleep Time	416.0	423.4
Time in Bed	458.1	478.4
Sleep Efficiency	91.2	88.7

# Theories of Insomnia 4: Neurobiological and Neurocognitive Models

- ...But individuals with insomnia **perceive their sleep to be bad**

Sleep Diary Variable	Group 1 - ??	Group 2 - ??
Time to Fall Asleep	15.6	37.2
Wakefulness at Night	10.1	41.3
Total Sleep Time (h)	7.3	6.6

## Theories of Insomnia 4: Neurobiological and Neurocognitive Models

- PSG-determined sleep of insomnia **isn't that bad** compared to self-report
- Individuals with insomnia **perceive their sleep to be bad**
- Insomnia is the result of sleep- and wake-promoting regions **simultaneously activated** during sleep

## Theories of Insomnia 4: Neurobiological and Neurocognitive Models

- PSG-determined sleep of insomnia **isn't that bad** compared to self-report
- Insomnia is the result of sleep- and wake-promoting regions **simultaneously activated** during sleep

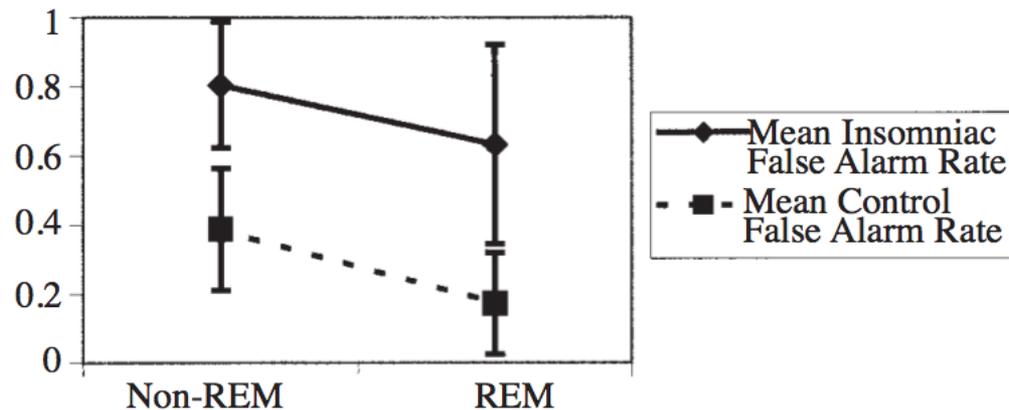
CBT-I targets this “aroused brain”

# Imagine...

- A tone is played at multiple points during the night, and you're supposed to answer one question: "Was I awake just before that tone sounded?"

# Imagine...

- A tone is played at multiple points during the night, and you're supposed to answer one question: "Was I awake just before that tone sounded?"



**Figure 3**—Mean false alarm rates (probability of identifying prior sleep as wake) for Insomniacs and Controls, for probes occurring in both non-REM and REM sleep, incorporating SD error bars.

# Approaches to Treatment



Pharmacotherapy



Cognitive Behavioral Therapy for  
Insomnia (CBTI)

# Treatment: Pharmacotherapy

- Benzodiazepines: lorazepam (ativan), diazepam (valium)
  1. Changes in sleep architecture
  2. "Day-after" effects
  3. Tolerance
  4. Discontinuation effects
- Nonbenzodiazepine receptor agonists: Zolpidem (ambien), zaleplon (sonata), eszopiclone (lunesta)
  1. Memory disturbance
  2. Nightmares
  3. Daytime drowsiness
  4. Increased risk for accidents

.. Sleep doesn't look that different!



# Treatment: Pharmacotherapy

- Indicated for short-term management of insomnia
- Often not taken short term
- Physiological and psychological dependence
- Rebound insomnia on discontinuation
- Published taper schedules to help discontinuation



# Treatment: Naturopathic

- Limited evidence for effect of various herbs
- Melatonin has mild hypnotic effect
- Dosing and timing of melatonin is very important!

Magnesium

Ashwaganda

GABA

Kava

Valerian

Chamomile

And on and on...



# Treatment - CBTI

- CBTI is multicomponential
  - Behavioral: Sleep Restriction, Stimulus Control, Sleep Hygiene
  - Cognitive: Worry, Attention, Beliefs About Sleep
  - Psychoeducation
- CBTI is effective
  - Multiple meta-analyses
  - Improvements equivalent or superior to pharmacotherapy
  - Brief – 4-8 sessions

# CBTI: Behavioral Targets

**STIMULUS CONTROL:** Reverse association between bed and not sleeping

- Go to bed only when sleepy (not just tired)
- Limit bed and bedroom activities to sleep and sex
- Get up at the same time every morning
- **Get out of bed within 15-20 minutes if unable to sleep**

# CBTI: Behavioral Targets

**SLEEP RESTRICTION:** Strengthen homeostatic drive

- Have patient keep a sleep diary for 1-2 weeks
- Calculate “Sleep Efficiency” percentage by dividing weekly total sleep time by time in bed

In the morning, fill out the information for the prior night... <span style="float: right;">night mo/day</span>	Tuesday 3/25	Mon /	Tues /	Wed /	Thurs /	Fri /	Sat /	Sun /
1. Yesterday, I napped from ____ to ____ (Note the times of all naps)	1:50 to 2:30pm			5:00- 5:45pm			2:00- 4:00pm	
2. Yesterday, I took ____ mg of medication and/or ____ oz of alcohol as sleep aid.	Halcion 0.125 mg		Ambien 10mg			Ambien 5mg		
3. Last night, I went to bed and turned the lights off at ____ o'clock (AM or PM).	10:45pm 11:15pm	10:30pm 11:00pm	11pm 11pm	10pm 10:45pm	10pm 11pm	11pm 11pm	12am	11:30pm
4. After turning the lights off, I fell asleep in ____ minutes.	40 min	15	0	15	30	5	15	30
5. My sleep was interrupted ____ times (specify number of nighttime awakenings).	3	2	1	3	5	0	2	3
6. My sleep was interrupted for ____ minutes (specify duration of each awakening).	10 5 45	60 120	15	60 30 30	20, 20, 20, 30, 15	0	90 60	30 15 45
7. Last night, I left my bed ____ times.	3	0	1	1	0	0	1	1
8. This morning, I actually awoke at ____ o'clock (note time of last awakening).	6:15am	7am	7am	9am	6:30am	7am	10am	10am
9. This morning I had planned to wake up at ____ o'clock AM or PM (or leave blank if you did not plan a specific time).		7am	6:30am	7am	7am	7am	8am	9am
10. This morning, I actually got out of bed at ____ o'clock (specify the time).	6:40am	7:30am	7am	9:30am	7am	7:30am	10:30am	11am
11. When I got up this morning I felt ____ (answer on a 1 to 5 scale; 1 = exhausted, 5 = refreshed).	2	1	2	1	1	3	2	1
12. Overall, my sleep last night was ____ (answer on a 1 to 5 scale; 1 = restless, 5 = very sound).	3	2	4	1	1	4	2	1

# CBTI: Behavioral Targets

**SLEEP RESTRICTION:** Strengthen homeostatic drive

- Have patient keep a sleep diary for 1-2 weeks
- Calculate “Sleep Efficiency” percentage by dividing weekly total sleep time by time in bed
- **Restrict time in bed to total sleep time**
- Increase time in bed slowly (e.g. 30 minutes) if sleep efficiency is 85-90%; decrease time in bed if SE is <80%; remain steady at 80-85%
- No napping

# CBTI: Behavioral Targets

## **SLEEP HYGIENE:** Lifestyle factors

- Caffeine
- Nicotine
- Exercise
- Diet
- Sleep environment (temperature, noise)
- **Not effective as a standalone strategy** (Morin et al., 2006)

# CBTI: Cognitive Targets

- Interventions for worry
  - Automatic thought worksheets

SITUATION	EMOTION	AUTOMATIC THOUGHTS
When I woke up last Tuesday morning (7am)	Exhausted	Here we go again I feel terrible Wish I could sleep in I can't cope
At 2am last night	Anxious Uptight Angry	Oh no, it's 2am This is ruining my life I've got to get back to sleep
First time awake after falling asleep	Distress Hunger Procrastination	If I get out of bed, I'll be up for the next several hours. I can't get out of bed. Getting out of bed is too much of an effort. If I get out of bed now, I am going to ruin my sleep for the rest of the night.

# CBTI: Cognitive Targets

**Situation:** \_\_\_\_\_

**Thought:** \_\_\_\_\_

**Emotions** *(please rate each on a 1-100 scale):*

- Is this thought realistic?
- What's the worst that could happen? Could I live through it?
- What's the best that could happen? What's the most realistic outcome?
- What is the evidence for this thought? What is the evidence against this thought?
- Is this thought helpful?

# CBTI: Cognitive Targets

- Interventions for worry
  - Automatic thought worksheets
  - Mindfulness and relaxation training
  - Helpful and unhelpful strategies

# CBTI: Cognitive Targets

- Interventions for worry
  - Automatic thought worksheets
- Interventions for unhelpful beliefs about sleep
  - Behavioral experiments
  - Unhelpful belief: “When I’m tired during the day, the only remedy is to sleep or rest”
  - Construct an experiment: two days ‘conserving’ energy, two days ‘spending’ energy
  - Allow client to see outcome

energy level

No energy

100  
Loads of energy

### Record Sheet for Behavioural Experiments

do things when tired.

Aim and prediction What do I want to find out? What do I think will happen?	Experiment How will I test my prediction?	Outcome What actually happened? Was the prediction correct?	What I learned
<p>Are energy levels during the day like</p> <p>a) a leaky battery that can only be topped up by a nap <u>OK</u></p> <p>b) elastic - the more we generate energy the more we get</p> <p>Prediction = open</p>	<p>One day do as you usually do ie take a nap, do your activities as normal</p> <p><b>CONSERVE</b></p> <p>VS</p> <p>Another day <b>generate</b> energy</p> <p>- brisk walk to the shops + engage with people along the way (eg. smile at those who walk past + engage with shop keepers)</p>	<p>5/25 conserve 70 zazen 30 minutes 15 min relax + tape</p> <p>5/27 60 zazen 30 minutes 15 min relax + tape</p> <p>5/28 75 zazen to sleep</p> <p>5/33 60 walked to [redacted] the natural [redacted] more energy after</p> <p>5/34 30 put things away, wait for [redacted]</p> <p>5/36 70 went with head sto [redacted]</p> <p>5/38 80 go to J + cho [redacted]</p>	<p>before: tired - 50 after 70</p> <p>before - 60 after 80</p> <p><del>w/tape + before - 55-60</del> <del>after party 80</del> 60 before - 75 after</p> <p>can walk when tired → can do things when tired.</p> <p>? 2 days w/o nap excessive ? was not a true no nap - late to bed 10:30! up 9:45 tired before hairie - 55-60 after party 80</p>

- (b) aesthetics → flowers, houses
- (c) shops → selectively produce what you will enjoy

# CBTI: Cognitive Targets

- Interventions for worry
  - Automatic thought worksheets
- Interventions for unhelpful beliefs about sleep
  - Behavioral experiments
- Interventions for attentional bias

# Monitoring for Sleep Related Threat

## Pre-sleep

- (1) body sensations consistent/inconsistent with falling asleep
- (2) the environment for signs of not falling asleep
- (3) the clock to see how long it is taking to fall asleep
- (4) calculating how much sleep will be obtained
- (5) needing to visit the bathroom

## On waking

- (5) body sensations for signs of poor sleep
- (6) the clock to calculate how much sleep was obtained

## During the day

- (7) body sensations for signs of fatigue
- (8) mood for indications of tiredness/not coping
- (9) performance for indications that attention, memory and concentration are failing

# Monitoring for Sleep Related Threat

## Pre-sleep

- (1) body sensations consistent/inconsistent with falling asleep
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- (6) the clock to calculate how much sleep was obtained

## During the day

- (7) body sensations for signs of fatigue
- (8) mood for indications of tiredness/not coping
- (9) performance for indications that attention, memory and concentration are failing

# Clock Monitoring Experiment

## Record Sheet for Behavioural Experiments

<b>Aim and prediction</b> What do I want to find out? What do I think will happen?	<b>Experiment</b> How will I test my prediction?	<b>Outcome</b> What actually happened? Was the prediction correct?	<b>What I learned</b>
<p><b>Aim:</b>            To see if looking at the time is helpful or not.</p> <p><b>Prediction:</b></p> <ul style="list-style-type: none"> <li>• it might make me more stressed to know what the time is</li> <li>• it might be helpful to not see the time - less pressure on sleep</li> </ul>	<p>3 nights without the watch/clock (put clock under the bed)</p> <hr/> <p>3 nights with the watch</p>	<p>I didn't worry overmuch about what the time was</p> <p>Therefore less pressure on sleep</p>	<p>I was able to not think about the time + therefore leave that out of the equation. This meant one less stimulus to keep my brain active. Whether I could maintain the strategy during a bad night is debatable.</p>

# CBTI: Cognitive Targets

- Interventions for worry
  - Automatic thought worksheets
- Interventions for unhelpful beliefs about sleep
  - Behavioral experiments
- Interventions for attentional bias
- Reducing safety behaviors – separate bedroom, eye mask, canceling evening plans, calling in sick after bad night of sleep

# Sleep Scenario 3:

## The Adult Who Can't Sleep

Helen is a 43-year-old married mother of two struggling with chronic insomnia. Helen reports frequently waking up at 2am and will often remain awake for several hours, sometimes unable to fall back asleep at all. She remains in bed trying to clear her mind but often finds her thoughts turning to her wakefulness and fears for how exhausted she will be in the day following.

To cope with her insomnia, Helen will sleep slightly later following a bad night (7am instead of 6am). She sometimes calls in sick to work or, if she does go to work, she will fill her day with mundane tasks and avoid challenging ones. Helen wishes she could take a nap but often feels too anxious to do so.

Helen avoids anything that might wake her up in the middle of the night – distressing television shows, drinking liquid after 7pm. She has also started sleeping in a separate room from her husband, fearing he might contribute to the problem, and now occupies the guest room in their home. Helen has tried multiple sleep medications, each of which has lost effectiveness over time. She currently takes temazepam 15mg QHS.

How can we help Helen?

# Workshop Agenda

- 9:00-9:30 The importance of sleep, sleep health and the intersection of sleep and psychology
- 9:30-10:00 Introduction to sleep physiology and sleep across the lifespan
- 10:00-10:30 Light, caffeine, electronics, and other 'sleep stealers'
- 10:30-10:45 Break
- 10:45-11:30 Sleep Scenario #1: The Sleepy Teen (assessing and addressing circadian rhythm disorders)
- 11:30-12:00 Sleep Scenario #2: The Young Adult with Nightmares (understanding and addressing Nightmare Disorder)
- 12:00-1:00 Lunch
- 1:00-2:00 Sleep Scenario #3: The Adult Who Can't Sleep (theoretical models on the etiology and pathophysiology of insomnia; defining and assessing insomnia, pharmacological and behavioral treatments for insomnia)
- **2:00-2:30 Sleep Scenario #4: The Adult Who Sleeps Too Much (understanding and addressing hypersomnolence in various populations)**
- 2:30-3:00 Sleep Scenario #5: The Adult Who Snores (understanding and assessing obstructive sleep apnea; when, how and to whom to refer; treatment options)
- 3:00-3:30 Sleep Scenario #6: The Older Adult Who Naps (improving sleep health in elderly populations)
- 3:30-4:00 Q&A and Course Evaluation (30 minutes)

# Sleep Scenario 4:

## The Adult Who Sleeps Too Much

Nanette, 41-year-old Caucasian female, diagnosed with Bipolar Disorder type I in 1997, currently euthymic. Also meets criteria for Generalized Anxiety Disorder. IDS-C=10.

Single, lives alone, no dependents. Currently on disability, taking courses at community college.

Medications: Depakote 1500mg QAM, Prozac 40mg QAM, Synthroid .05mg QAM, Seroquel 50mg QHS

BMI = 30.7. No evidence for other sleep disorders on PSG.

Uses bed for watching TV, reading, studying, eating, using computer; reports difficulty falling asleep, staying asleep, awaking too early in the morning.

# Diagnosing Hypersomnia

- Narcolepsy type I and II
- Idiopathic Hypersomnia
- Kleine-Levin Syndrome
- Hypersomnia associated with a psychiatric disorder
- Hypersomnia due to medical disorder
- Hypersomnia due to a medication or substance
- Insufficient Sleep Syndrome
- *SRBDs*
- *PLMs*

# Definitions of Hypersomnia

Long Sleep at Night

Main sleep period  
> 9 hours

Excessive Daytime  
Sleepiness

Multiple lapses into sleep  
Within the same day

Sleep Inertia

Difficulty waking up from  
Sleep or following naps

# Hypersomnia in the Laboratory

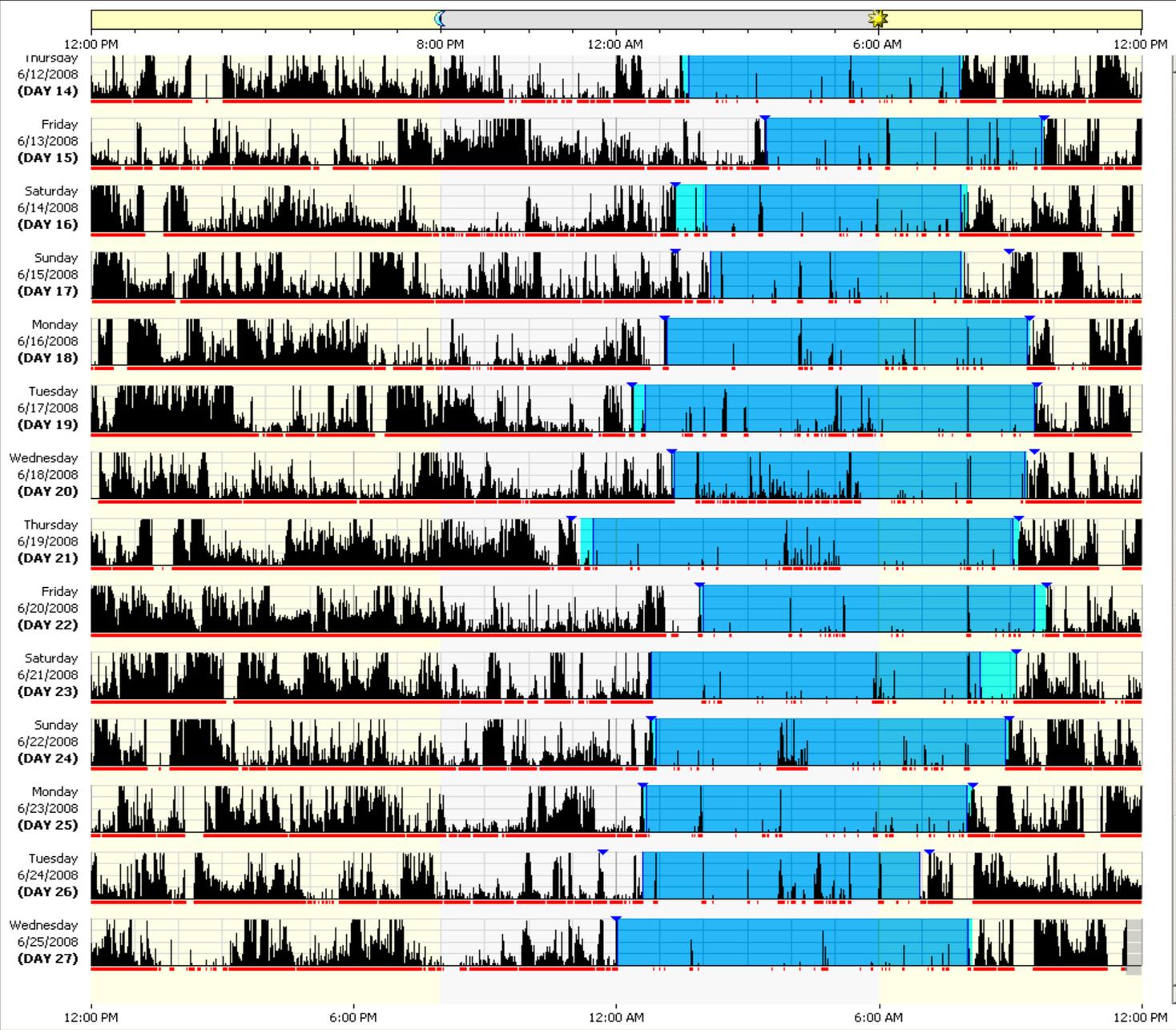
Individuals with psychiatric hypersomnia:

- Sleep no longer at night, and fall asleep no more quickly during the day (Nofzinger et al., 1991; Dolenc et al., 1996)
- Are unlikely to sleep past 9 hours in an uninterrupted PSG protocol (Billiard et al., 1994)

*A disorder of time in bed (TIB) rather than total sleep time (TST)?*



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- SUBJ 127 W
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- SUBJ 132 W
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**Actogram Length**  
Auto (14) Days

**Graph Width**

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Max: 1000  
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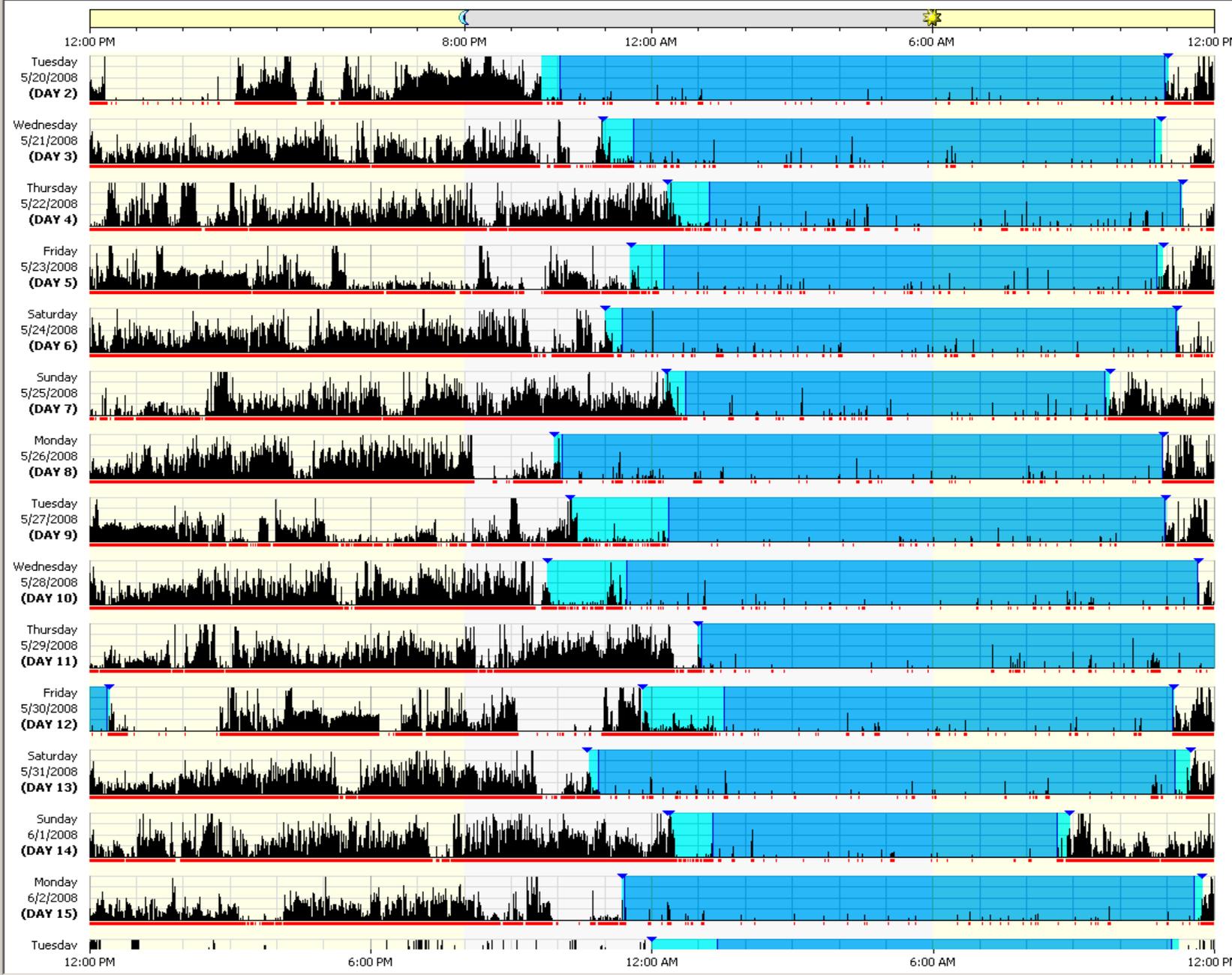
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**Interval Legend**

- Rest (R)
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To set an interval:  
1. Left click on an Actogram to place epoch label.  
2. Right-click or use [keyboard controls](#) to set intervals.



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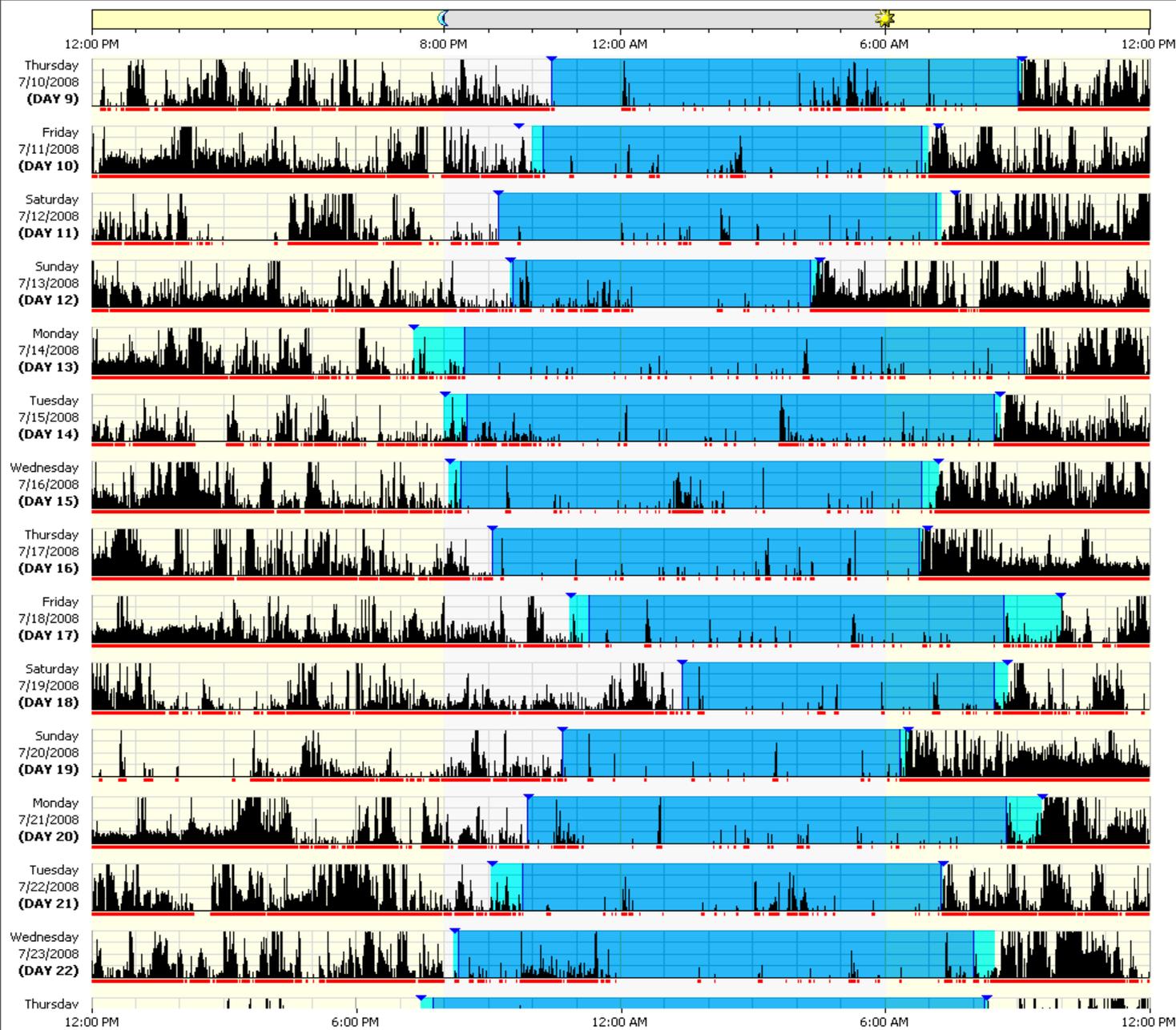
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Database Viewer

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# The Significance of Hypersomnia

Hypersomnia in the general population is associated with:

- More emotional disturbance in teens (Roberts et al., 2003)
- More substance use and future depression (Breslau et al., 1996; Ford et al., 2001)
- More impairment in daily functioning in older adults (Gooneratne et al., 2003)
- Long sleep confers 1.3x increase in all-cause mortality (Caccioppo et al., 2010)

# Hypersomnia in Mood Disorders

In *unipolar* depression, hypersomnia is:

- Prevalent in roughly 30% of MDEs (Baldwin & Papakostas, 2006)
- Resistant to pharmacotherapy (Worthington et al., 1995)
- The most frequent symptom cited by those not achieving remission from depression (Zimmerman et al., 2005)

In *bipolar* depression, hypersomnia is:

- Prevalent in roughly 40% of MDEs (Kaplan & Harvey, 2009)
- Third most consistently recurring depressive symptom (Liebenluft et al., 1995)
- Particularly prominent in individuals with bipolar II (Akiskal & Benazzi, 2005; Benazzi, 2006)

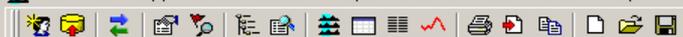
# What Causes Hypersomnia?

- Genetic factors
- Homeostatic factors
- Circadian factors
- Behavioral factors



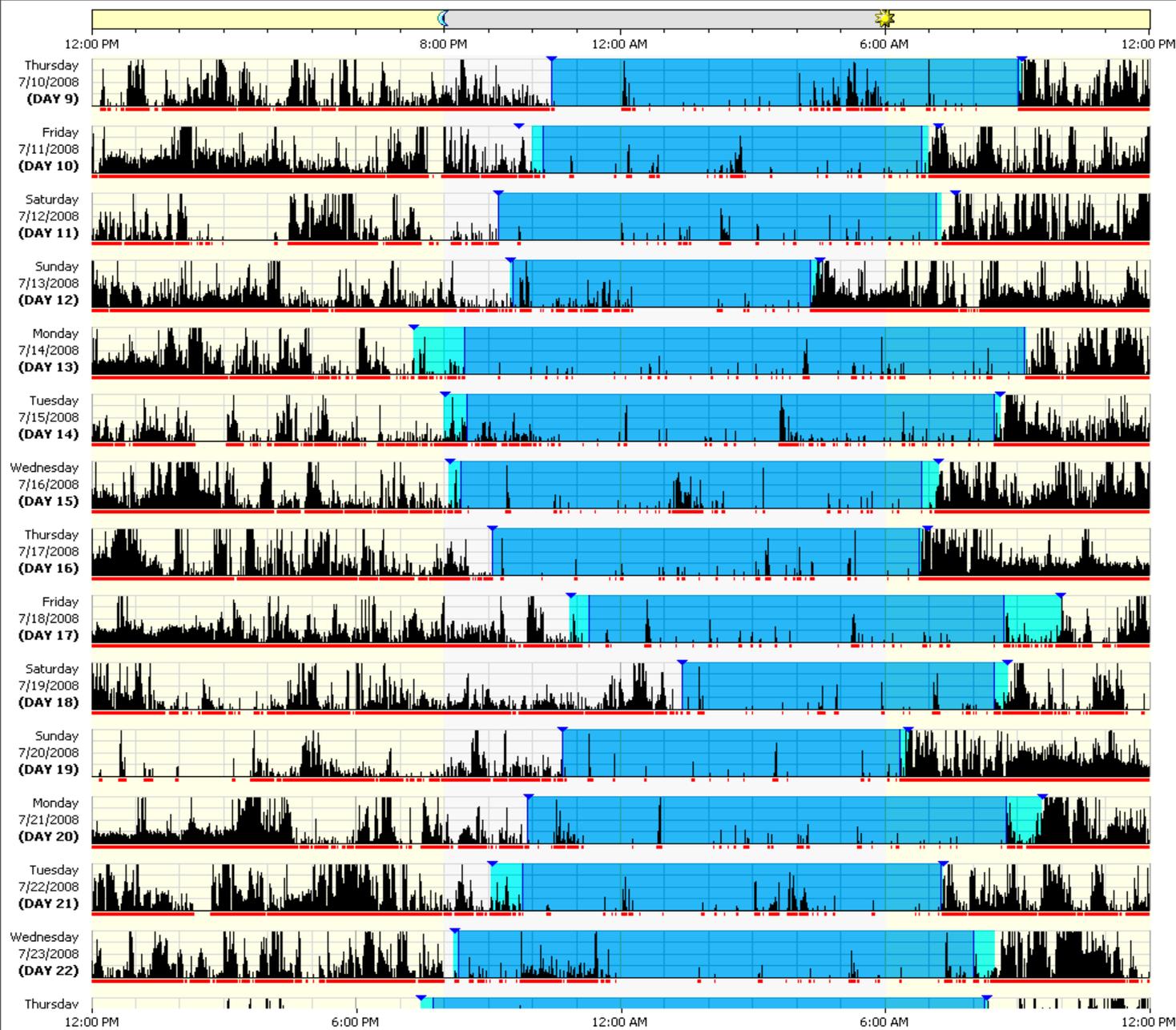
# Treating Hypersomnia





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# Can CBTI be Used to Treat Insomnia and Long Sleep?

- Patients with insomnia referred for group CBTI treatment at Stanford (N=320)
- ‘Long Sleepers’ with total sleep times in the top 15% (average TST=8.0 ± 0.6 hours) were compared to remainder of group

At the conclusion of treatment, Long Sleepers reported sleeping 40 minutes *less* on diary TST, compared to remainder of group which slept 14 minutes more

Despite sleeping less, long sleepers reported feeling less sleepy

# Psychological Treatment of Hypersomnia

Three main components:

- *Sleep-wake schedule*
  - Consistent weekdays to weekends
  - Sleep Restriction: Reduce time spent in bed to the amount of time slept
  - Stimulus Control: Only go to bed when sleepy, keep bed and bedroom for sleep and sex only; get out of bed if unable to sleep; reduce napping

# Psychological Treatment of Hypersomnia

Based on Cognitive Behavioral Therapy for Insomnia (CBTI), consists of three main components:

- *Targeting sleep-wake schedule*
  - Consistent weekdays to weekends
  - Start generously (e.g. 9 hours TIB), restrict as needed... more TIB=more time awake

Please rate how pleasant/unpleasant or 'aroused' you feel RIGHT NOW.	40	62	51	42	31
2. Yesterday, I napped from _____ to _____ (Note the times of all naps)	1:50 to 2:30pm	—	12-6	—	1-6
3. Yesterday, I took _____ mg of medication and/or _____ oz of alcohol as sleep aid.	Halcion 0.15 mg	Serenoel 75mg	Serenoel 50	—	4
4. Last night, I went to bed at _____ and turned the lights off at _____ o'clock (AM or PM).	10:45pm 11:15pm	3a	1a	10P 11P	11P 11:15P
5. After turning the lights off, I fell asleep in _____ minutes.	40 min	30min	30min	15min	15min
6. My sleep was interrupted _____ times (specify # of nighttime awakenings).	3	—	—	1-2	—
7. My sleep was interrupted for _____ minutes (specify duration of each awakening).	10 5	—	—	2	—
8. Last night, I left my bed _____ times.	3	←	—	—	—
9. This morning, I actually awoke at _____ o'clock (note time of last awakening).	6:15am	10:30a	9:30a	10:00a	9:00a
10. This morning I had planned to wake up at _____ o'clock AM or PM (or leave blank if you did not plan a specific time).	6:30am	—	—	—	—
11. This morning, I actually got out of bed at _____ o'clock (specify the time).	6:40am	10:30a	10:45a	10:30a	10:00a
12. Overall, my sleep last night was _____ (answer on a 1 to 5 scale; 1 = restless, 5 = very sound).	3	1	3	4	3
13. Using the grid at right, please rate how 'pleasant/unpleasant' or 'aroused' you felt AT BEDTIME.	35	65	30	42	48
14. Immediately upon waking I felt _____ (Please use the scale on bottom right)	6	6	4	6	4
15. How hopeful do you feel about the day ahead? (answer on a 1 to 7 scale; 1 = not at all hopeful, 7 = very hopeful).	4	1	3	3	3
16. How do you feel right now? (1 to 7 scale; 1 = very sad, 7 = very happy).	5	3	4	3	3
17. How long did it take you to feel fully alert and aroused this morning, in min.?	30 min	45min	15min	60min	35min
		74	8	10h43m 6:43	9.5 590

GOALS:

Night-time:

- Feeling like having some flexibility around when to go to bed at night
- Making sleep more restful and consolidated
- Refraining from using sleep as avoidance/ a "drug"

Day-time:

- Feeling more alert in mornings
- Having more energy throughout the days

Understand sleep need.



# HOMEWORK

## 1. Sleep window (12-9am)

- Kate will call at 9am
- Set multiple alarms out of reach
- Other phone calls
- Automatic coffee maker
- Blinds partially open
- Keep phone charger at computer desk  
and don't bring phone to bed.

## 2. WIND DOWN

- stop computer use
- brush teeth
- turn off buffy
- reading or writing

## 3. Read NAT handout and practice catching NATs during the week.

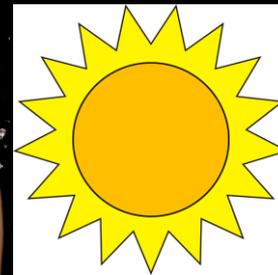
# Psychological Treatment of Hypersomnia

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- *Targeting sleep-wake schedule*
  - Consistent weekdays to weekends... encourage circadian regularity
  - Start generously (e.g. 9 hours TIB), restrict as needed... more TIB=more time awake
- *Focus on Daytime energy*
  - Encouraging morning routine to counteract sleepiness: LIGHT, activity, temperature modulation

# The **RISE UP** Routine

- **Refrain from snoozing** (Wirz-Justice, 2003; Leary, 2002)
- **Increase activity in the first hour** (Leproult et al., 1997; Matsumoto et al., 2002)
- **Shower or wash face with cold water** (Krauchi et al., 2004, 2006; Hayashi et al., 2003)
- **Exposure to sunlight** (Lewy et al., 1980; Wever et al., 1989)
- **Upbeat music** (Bonnet & Arand, 2000; Hayashi et al. 2004)
- **Phone a friend** (Neri et al., 2002; Dijkman et al., 1998; Ehlers, 1993)



## -MORNING CHECKLIST-

**Directions:** Please try the **RISE UP** routine every morning for the coming week. It is really important that you do the routine every day to see its impact on your daytime and nighttime sleeping habits. To help you remember the components, please write the date on the top column and check-off the activities you complete each morning. We will check in after a few mornings to see how the routine has been going.

		Day: Date:	Example: Tuesday 7/11/10	10/21/10	10/22/10	10/23/10	10/24/10	10/25/10	10/26/10	10/27/10
	Breakfast			—	✓	Coffee	<del>☒</del>	✓	✓	✓
	AM appointment		✓		BP Group	Dana	—	Class	Therapy	
	Refrain from snoozing	✓	✓	stayed in bed until 12p - Snoozed	stayed in bed for 20 min	→ 30 min	stayed in bed until 12p - snoozed	Snoozed 30 min	Snoozed 2 hours	
	Increase activity for the first hour Please list activities	✓ Went for bike ride, did dishes	✓ Presentation MHA SF	—	Cooking, Cleaning	Computer	Cooking	Cleaning	Cleaning	
*	Shower or wash face and hands	✓	Wash Face	✓	Shower	✓	✓	Shower	✓	
	Expose yourself to sunlight	✓	✓	Driving	Opened window →		Window	Driving	Walk	
*	Upbeat music	✓	—	w/alarm	Pet Shop	✓	✓	✓	✓	
	Phone or talk to a friend	✓	✓	later	10a Training w/ Dan BP group	Dana	✓	✓	✓	

# Psychological Treatment of Hypersomnia

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  - Strategies to generate energy, activity scheduling

DOT vs. SPDN of E experiment!  
**Record Sheet for Behavioral Experiments**

<b>Aim and prediction</b> What do I want to find out? What do I think will happen?	<b>Experiment</b> How will I test my prediction?	<b>Outcome</b> What actually happened? Was the prediction correct?	<b>What I learned</b>
<p>To see if saving energy (pot) vs. spending energy (sponge) leads to more energy in the daytime</p> <p>Prediction: latter will result in more energy</p>	<p style="text-align: center; border: 1px solid black; padding: 5px;">3-4PM</p> <p><del>WED</del> <u>SAVE</u>                      THUR Passive distractions</p> <p>FRI                      SAT Active distractions</p>	<p>Rate energy before + after 1-5</p> <p>Wed before 2                      after 2</p> <p>Th 3                      3</p> <p>Fri. 2                      4</p> <p>Sat. 3                      4</p>	<p>No <math>\Delta</math> if no more energy used.</p> <p>Energy level higher when energy spent.</p>

USE ACTIVE DISTRACTIONS  
 WHEN FEELING FATIGUED.

## ACTIVE DISTRACTIONS

- Taking walk around block
- Take shower / hygiene
- Eating breakfast (not in bed!)
- Looking at communications
- Going over to-do list
- Do dishes
- Little concrete tasks
- Dancing
- Singing
- ⊙ Reading book
- Taking pictures
- Doing TW
- Get out of house

Finding support groups / activities  
partners in EL - write down, print out,

## PASSIVE DISTRACTIONS

TV

Movies

Eating

Internet addiction

send email, make call  
limit time "Future  
tipping" - focus on  
present. Set  
timer → 30 min max.

# Psychological Treatment of Hypersomnia

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- *Focus on Daytime energy*
  - Encouraging morning routine to counteract sleepiness: LIGHT, activity, temperature modulation
  - Strategies to generate energy, activity scheduling
- *Addressing/ Challenging cognitions*
  - “There’s nothing to get up for.”
  - “My medications are to blame.”
  - “When I’m tired in the daytime, the only thing I can do is sleep.”

## Sagging Energy

3pm  
Various  
All day  
Afternoon  
2-4pm  
2pm  
3-4pm  
afternoon/morning  
2-3  
afternoon

## Coping

Walks ###  
Medication  
Caffeine // (-)  
Napping (-)  
Small snack //  
Call friend  
hot shower  
dressing how you  
want to feel  
take breaks  
get things done  
mix it up  
sun + fresh air

## ~~Strengths~~ <sup>(low energy)</sup> Reason for poor sleep

bad sleep IIII  
depression IIII  
anxiety  
time of day  
dreary weather  
low glucose  
bad diet  
lack of exercise  
demanding tasks  
no breaks  
hungry  
bored  
stressed

## Relax in eve

- Hot bath  
- Soothing music  
- Reading - ###  
- ↓ stimulation  
- Comedy TV (as long  
as not too stimulating)  
- Watch TV //  
- Shower  
- Herbal tea  
- Dim lights  
- Dishes/Laundry  
- Meditate

## Cope w/ bad sleep

- Stay in bed (-)  
- Ruminant (-)  
- Reduce stimulation  
- Avoid caffeine ###  
- Do fun things the next day  
- Exercise //  
- Avoid alcohol //  
- Go to bed early (-)  
- Eat well

Things helping sleep

- Seroguel
- Dark
- Quiet
- Feeling sleepy
- Big meal
- Hot shower



1. Using the grid to the upper right, please rate how 'pleasant/unpleasant' or 'aroused' you feel RIGHT NOW.	46	31	23	33	24
2. Yesterday, I napped from ____ to ____ (Note the times of all naps)	1:50 to 2:30pm	—	—	—	—
3. Yesterday, I took ____ mg of medication and/or ____ oz of alcohol as sleep aid.	Halcion 0.15 mg	50 mg Serax	—————		
4. Last night, I went to bed at ____ and turned the lights off at ____ o'clock (AM or PM).	10:45pm 11:15pm	11:30 12:45	12:00 12:30	12:00 12:00	11:45 1:00
5. After turning the lights off, I fell asleep in ____ minutes.	40 min	10 min	10 min	10 min	10 min
6. My sleep was interrupted ____ times (specify # of nighttime awakenings).	3	—	—	—	—
7. My sleep was interrupted for ____ minutes (specify duration of each awakening).	10 5	—	—	—	—
8. Last night, I left my bed ____ times.	3	—	—	—	—
9. This morning, I actually awoke at ____ o'clock (note time of last awakening).	6:15am	8:30	9:00	8:00	9:00
10. This morning I had planned to wake up at ____ o'clock AM or PM (or leave blank if you did not plan a specific time).	6:30am	9	9:00	9:00	9:00
11. This morning, I actually got out of bed at ____ o'clock (specify the time).	6:40am	9:45	10:00	9:00	9:15
12. Overall, my sleep last night was ____ (answer on a 1 to 5 scale; 1 = restless, 5 = very sound).	3	4	3	5	4
13. Using the grid at right, please rate how 'pleasant/unpleasant' or 'aroused' you felt AT BEDTIME.	35	25	23	33	26
14. Immediately upon waking I felt ____ (Please use the scale on bottom right)	6	2	2	1	1
15. How hopeful do you feel about the day ahead? (answer on a 1 to 7 scale; 1 = not at all hopeful, 7 = very hopeful).	4	5	5	6	6
16. How do you feel right now? (1 to 7 scale; 1 = very sad, 7 = very happy).	5	5	5	6	6
17. How long did it take you to feel fully alert and aroused this morning, in min.?	30 min	15 min	10 min	10 min	5 min

# Sleep Scenario 4:

## The Adult Who Sleeps Too Much

Nanette, 41-year-old Caucasian female, diagnosed with Bipolar Disorder type I in 1997, currently euthymic. Also meets criteria for Generalized Anxiety Disorder. IDS-C=10.

Single, lives alone, no dependents. Currently on disability, taking courses at community college.

Medications: Depakote 1500mg QAM, Prozac 40mg QAM, Synthroid .05mg QAM, Seroquel 50mg QHS

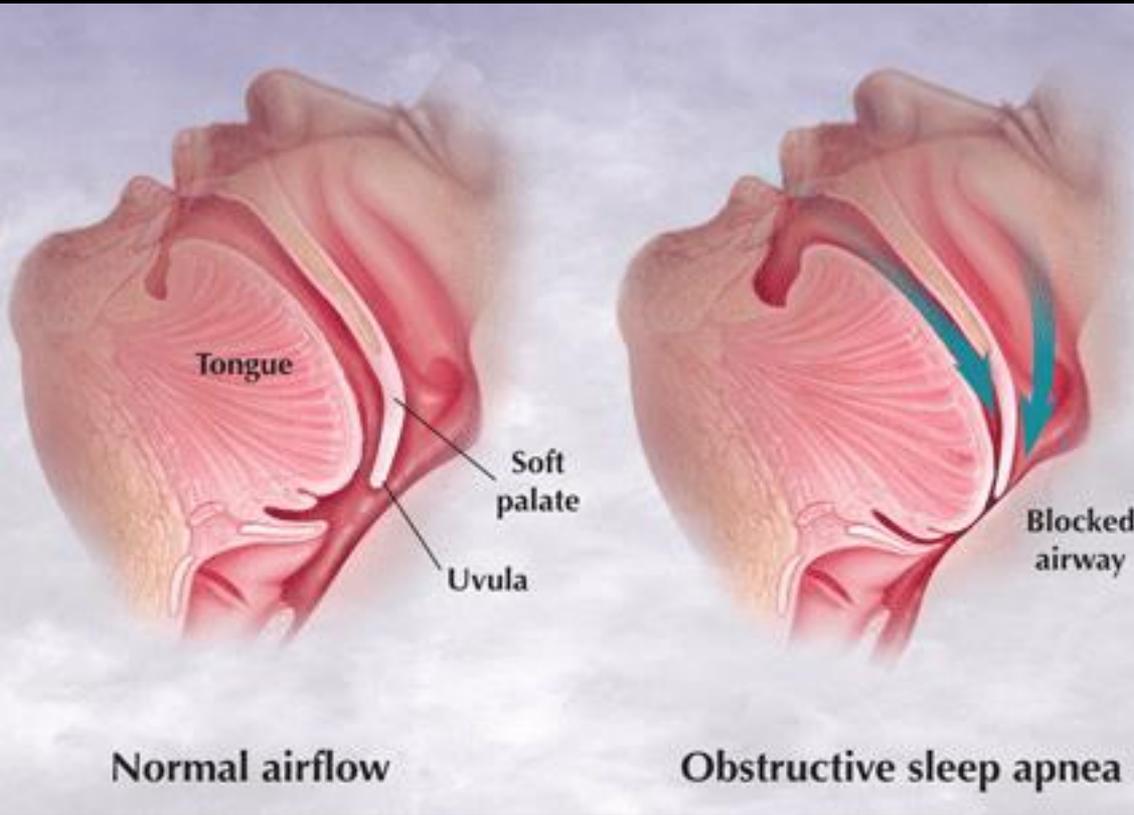
BMI = 30.7. No evidence for other sleep disorders on PSG.

Uses bed for watching TV, reading, studying, eating, using computer; reports difficulty falling asleep, staying asleep, awaking too early in the morning.

# Workshop Agenda

- 9:00-9:30 The importance of sleep, sleep health and the intersection of sleep and psychology
- 9:30-10:00 Introduction to sleep physiology and sleep across the lifespan
- 10:00-10:30 Light, caffeine, electronics, and other 'sleep stealers'
- 10:30-10:45 Break
- 10:45-11:30 Sleep Scenario #1: The Sleepy Teen (assessing and addressing circadian rhythm disorders)
- 11:30-12:00 Sleep Scenario #2: The Young Adult with Nightmares (understanding and addressing Nightmare Disorder)
- 12:00-1:00 Lunch
- 1:00-2:00 Sleep Scenario #3: The Adult Who Can't Sleep (theoretical models on the etiology and pathophysiology of insomnia; defining and assessing insomnia, pharmacological and behavioral treatments for insomnia)
- 2:00-2:30 Sleep Scenario #4: The Adult Who Sleeps Too Much (understanding and addressing hypersomnolence in various populations)
- 2:30-3:00 **Sleep Scenario #5: The Adult Who Snores (understanding and assessing obstructive sleep apnea; when, how and to whom to refer; treatment options)**
- 3:00-3:30 Sleep Scenario #6: The Older Adult Who Naps (improving sleep health in elderly populations)
- 3:30-4:00 Q&A and Course Evaluation (30 minutes)

# Obstructive Sleep Apnea



# Obstructive Sleep Apnea



# Obstructive Sleep Apnea



- Growing prevalence: 13% men, 6% women over 30 have moderate to severe OSA (Peppard, 2013); 20% will have AHI > 5
- Significant consequences of untreated OSA
  - Cardiovascular
  - Metabolic
  - Cognitive
- An increasing number of studies show certain consequences are reversible with CPAP treatment

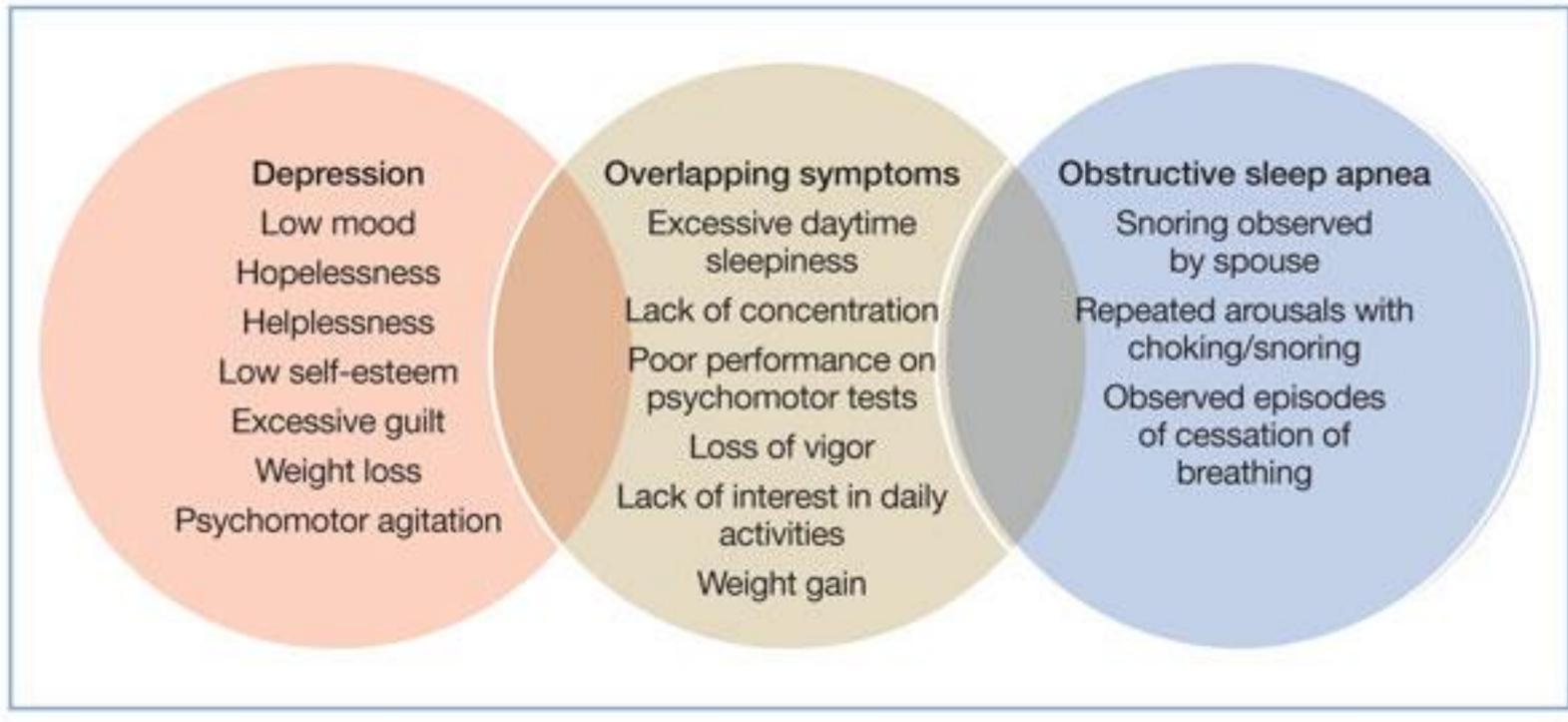
# Treatment Options

- CPAP = gold standard
- Mild OSA
  - Oral appliances
  - Positional therapies
  - Myofunctional therapy
- Surgical interventions for severe OSA
- See supplemental resources for referral options

# Why Care about OSA?

Figure

## OSA and depression: Where is the common ground?



# Obstructive Sleep Apnea



## Motivational Enhancement for CPAP Compliance

- MI to articulate resistance and ambivalence
- Habituation to mask, sounds and pressure of machine
- Troubleshooting

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# Case Illustration

Raymond is an 83-year-old Caucasian male with a presenting complaint of excessive daytime sleepiness and terminal insomnia. He lives alone and independently. Mental health history is notable for recurrent MDD, currently subthreshold at present.

Raymond reports napping 2-3x per day for 20-60 minutes at a time. He falls asleep regularly on his couch at 8pm and awakens at 1am, unable to return to sleep. Raymond will remain in bed until 5am attempting to re-initiate sleep.

What can we do to help Raymond?

# Sleep Hygiene + Lifestyle

- Avoid or reduce naps
  - Limit to one nap of 20 minutes duration
  - Strategize to prevent unintentional napping/dozing
- Avoid excessive caffeine use
- Behavioral activation / activity scheduling

# Addressing Sleep Need

- Correct unrealistic expectations about sleep need
- Large scale trials are aimed at *reducing* time in bed
- Often at the end of CBTI trials, older adults will get *less* sleep

## Cognitive Behavioral Therapy for Insomnia in Older Veterans Using Nonclinician Sleep Coaches: Randomized Controlled Trial

Cathy Alessi, MD,\*† Jennifer L. Martin, PhD,\*† Lavinia Fiorentino, PhD,‡ Constance H. Fung, MD, MSIS,\*† J. Michael Dziergowski, PhD,\*† J. Gregory L. Fort, MD,\*§ H. G. ... PhD, PhD,\*†

# Circadian Rhythm Disorders

- Advanced Sleep Phase Disorder
  - Advance in sleep period relative to clock time
  - At least three months in duration
  - Free to set schedule, sleep improves
  - Little or no difficulty initiating sleep

# Light Treatment

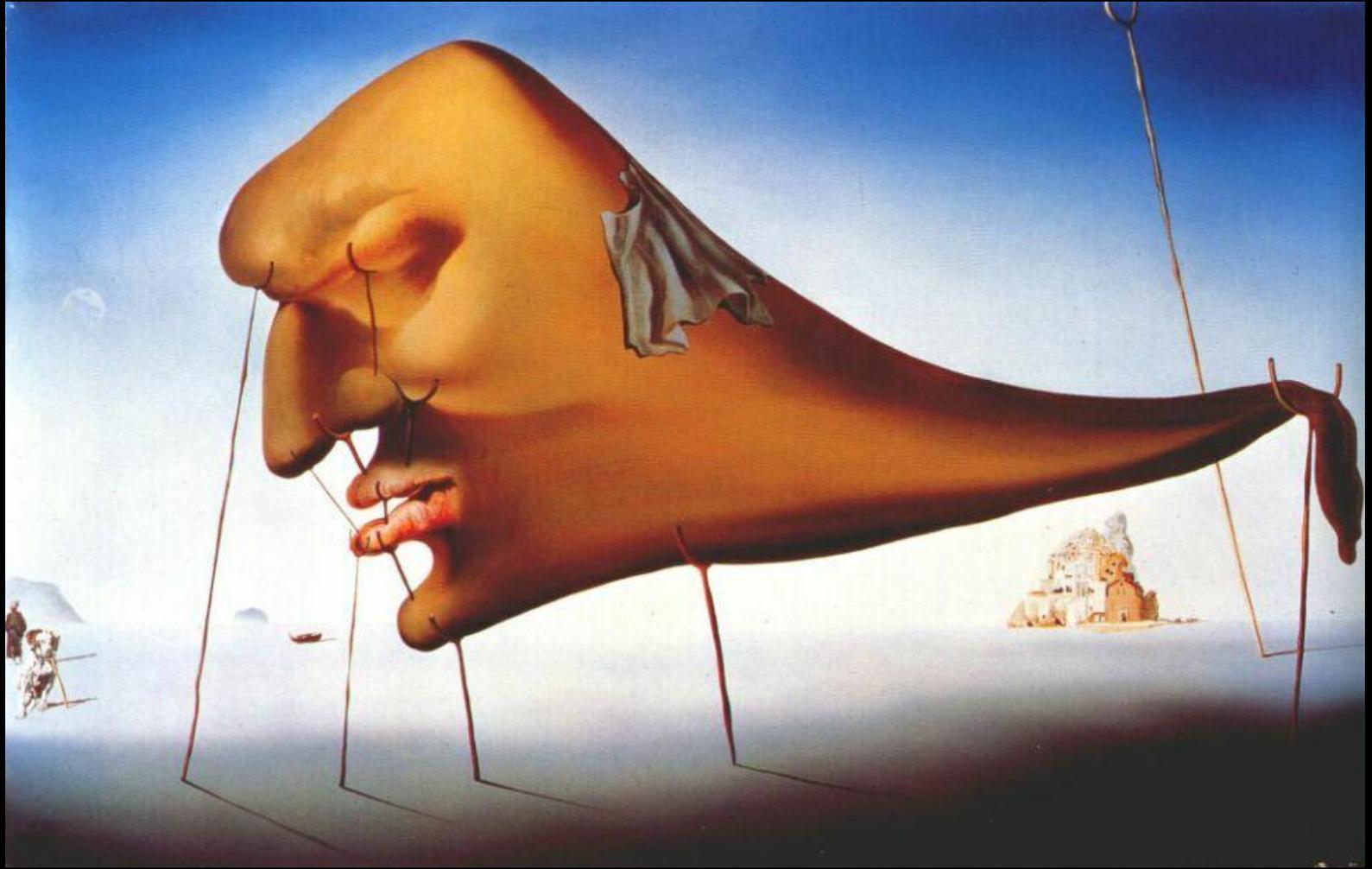
- Full spectrum, blue light or sunlight best
- Maximize light exposure in the evening (sunset walks)
- Minimize light exposure in early morning (consider orange safety goggles)



# Treatments Targeting Circadian Rhythms in Elderly

- Strategically-timed melatonin supplements
- Bright light to reduce daytime fatigue/napping and to treat phase advances







Thank You!

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