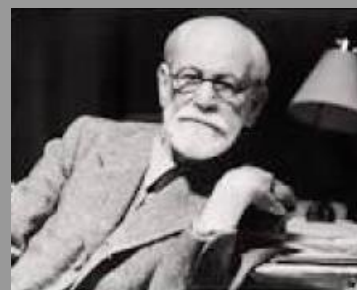


# Suggested Topics

- How a light box is more than a set of bulbs
- Dosing: What is a lux?
- Timing relative to the circadian clock
  - Assessing circadian phase of the individual patient
  - The phase-response curve for light
- Facing Reality: flexible vs. strict timing
- Light + antidepressants, hypnotics, antipsychotics, stabilizers
  - Masking the rhythm :-\\
  - Compatibility
  - Necessity
- Light and dark
  - Circadian darkness  $\neq$  lights out
  - Melatonin: maybe next year....
- Mild vs. extreme circadian phase delay
  - Genetic vs. environmental causes
  - Delayed and depressed (or not)
  - Motivational roadblocks for treating DSPD in adolescents and adults
- Dawn simulation vs. bright light therapy
- Light therapy as a component of Triple Chronotherapy

*You are invited throughout the workshop to come up to the front table to examine the devices and books, and pick up handouts..*



← (light off)

- How a light box is more than a set of bulbs



daylightc\_specs.jpg



daylightfx\_specs.jpg



DaylightLUX.jpg



diamondsml.gif



exec1.gif



golite250.jpg



healthlight2.jpg



LB\_FlipPlug\_Diag.jpg



lichttherapie\_im\_wohncim...



nlt-trav-elite\_small.jpg



pr-apollo.jpg



pr-brightspark1.jpg



pr-satellite.jpg



pr-visor.jpg



pr-zeus2.jpg



prod\_plus.jpg



prod\_too.jpg



rondosml.gif



Samalux 1b frei0210.jpg



Samalux 410 1b freig. 02..



samalux600.jpg



silverlitesml.gif



solwbiko\_x400.jpg



SunLightJR.jpg



Sunnexlight.jpg



SunRay.jpg



suntouch\_photo.gif



ultwwohc\_500x.jpg

## HOW TO POSITION THE DAYLIGHT “CLASSIC” MODEL 930 LIGHT BOX

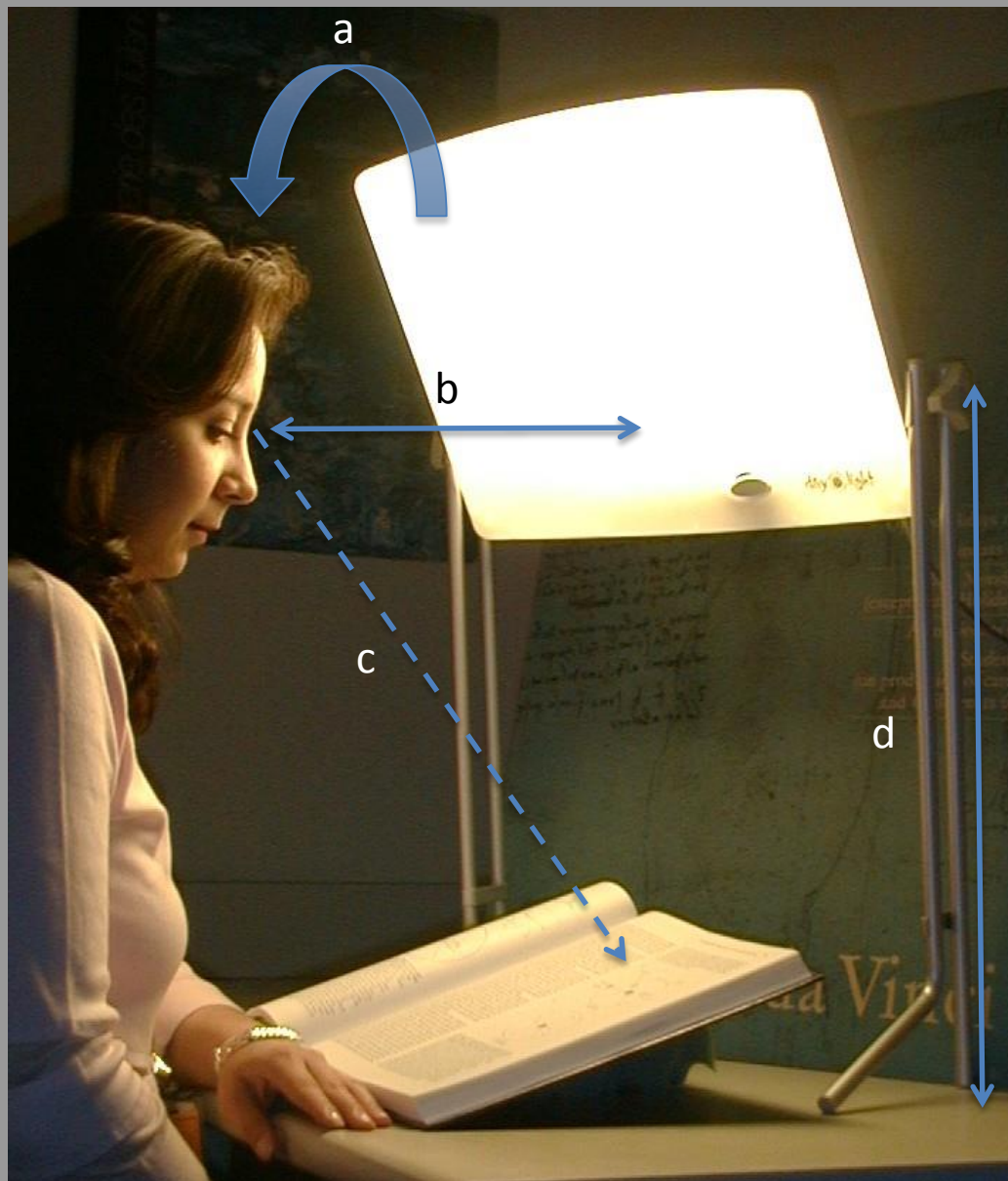
**a** – Tilt the screen forward to an angle of about  $30^{\circ}$  from the vertical.

**b** – When looking straight forward with your head erect, the distance of the eyes should be about 12 inches (30 cm) from the screen, for 10,000 lux light on the ‘high’ switch setting. Do not sit closer or bend in toward the screen.

**c** – Focus downward toward the table surface during the session. Do not look into the lights.

**d** – Adjust the height of the device, or your seat or table, so your eye level is  $\frac{1}{3}$  to  $\frac{1}{2}$  up the screen when looking straight forward with your head erect.

Copyright © 2011, Center for Environmental Therapeutics



## Day-Light Classic Plus vs Day-Light Classic



### What's the Same?

- 10,000 LUX at 12-14"
- 99.3% UV blocked
- Color Temp: 4000K / CRI: 85
- Meet all expert guidelines for clinical bright light therapy
- Use same key components— ballast, lens material and bulbs
- Two modes - Therapy (3 bulbs) or task (2 bulbs)
- 5 year warranty

### What's Changed on the NEW Classic Plus?

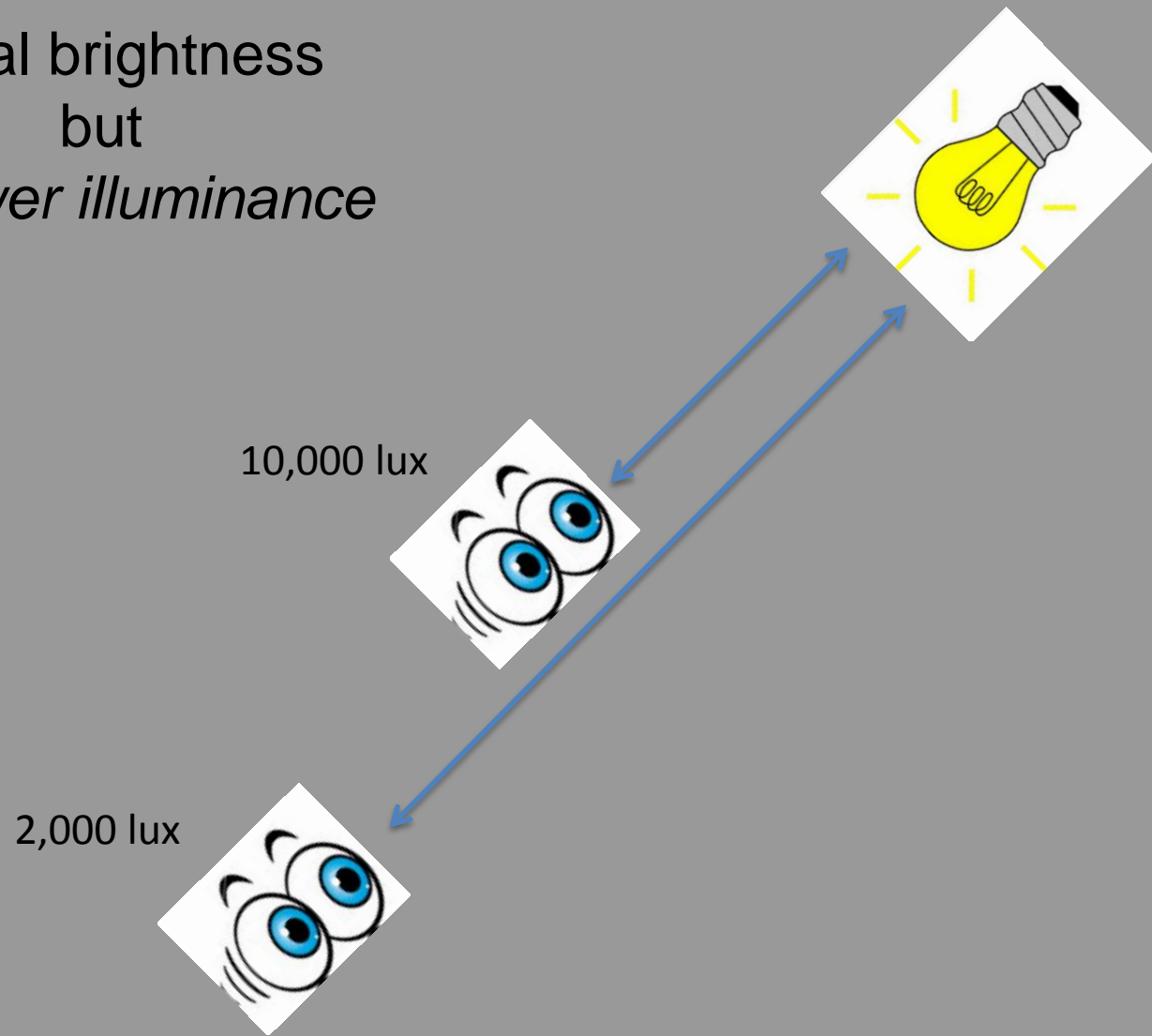
1. Slightly larger enclosure - increased field of illumination
2. Improved ventilation - better heat dissipation
3. Four easy-access screws vs 9 to remove lens for bulb changes
4. Power button moved to the side - clean, unobstructed profile
5. Easier to adjust angle and height & features 4 height settings vs 3 - improved flexibility for users
6. Attached single pedestal stand vs two independent legs - better stability and greater ease-of-use



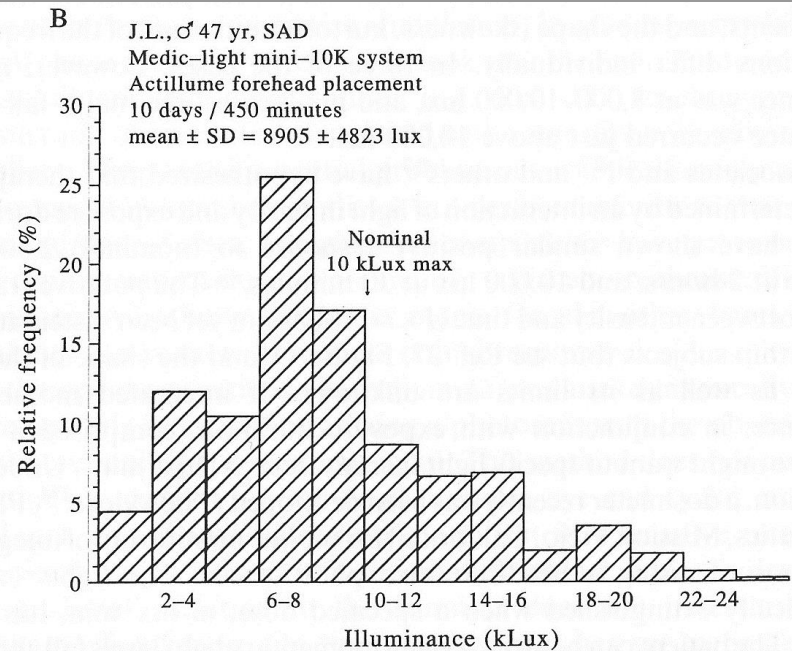
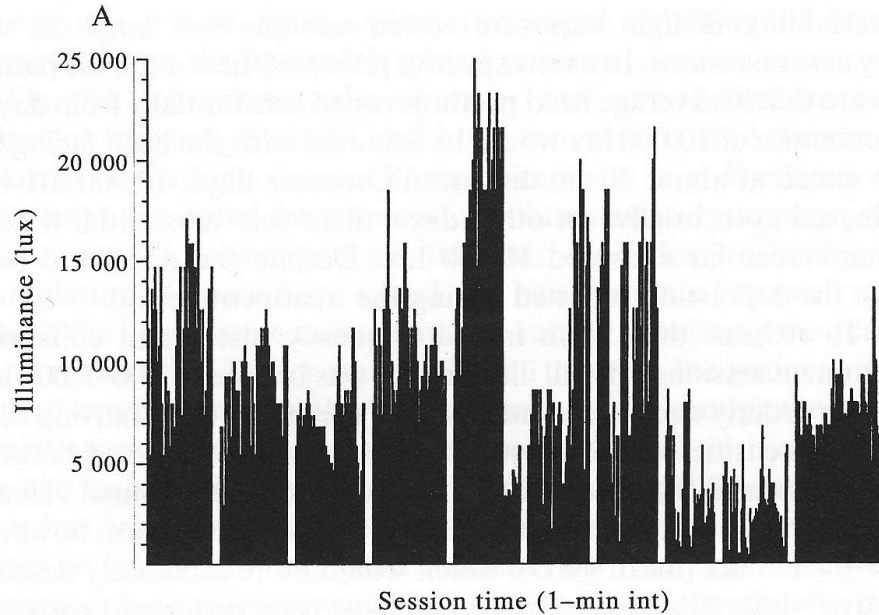
- Dosing: What is a lux?



Equal brightness  
but  
*far lower illuminance*



# lux received by a highly compliant patient



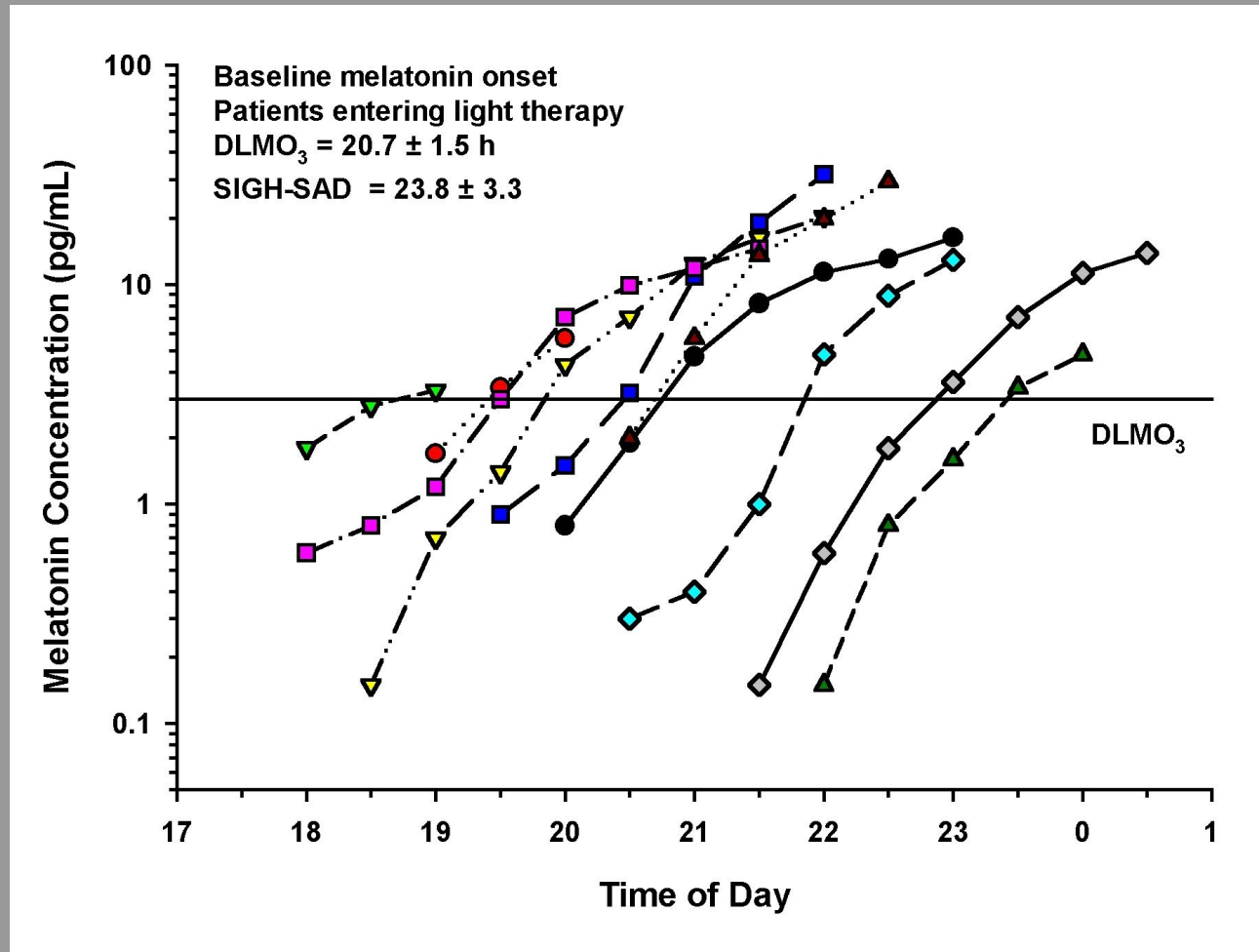
Terman M. Problems and prospects for the use of bright light as a therapeutic intervention.  
In: *Light and Biological Rhythms in Man*. Wetterberg L, Ed. Oxford, Pergamon, 1993.



- Timing relative to the circadian clock

- Assessing circadian phase of the individual patient
- The phase-response curve for light

# Individual differences in circadian timing

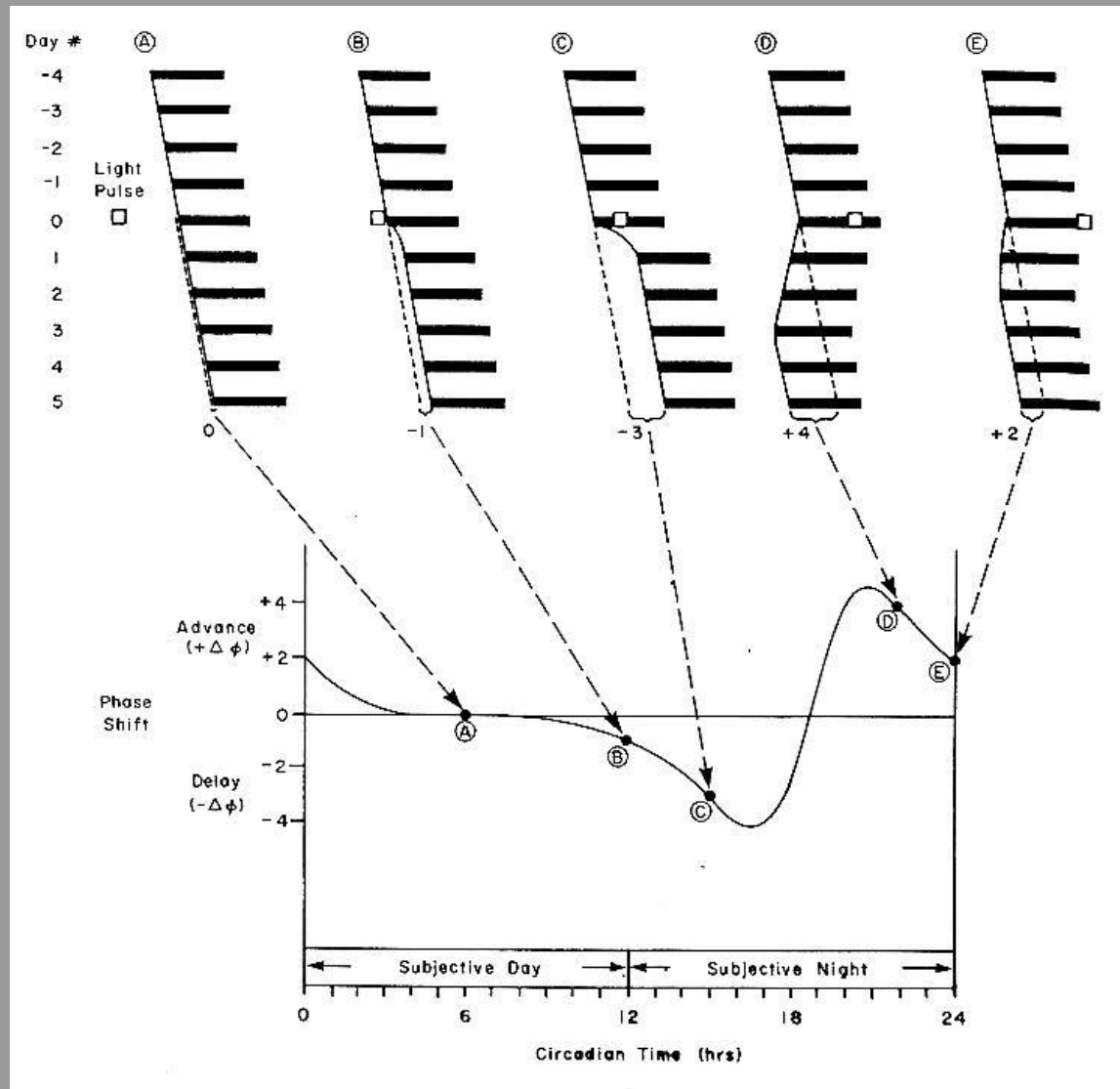


$DLMO_3$  = dim light melatonin onset defined as salivary concentration  $\geq 3$  pg/mL

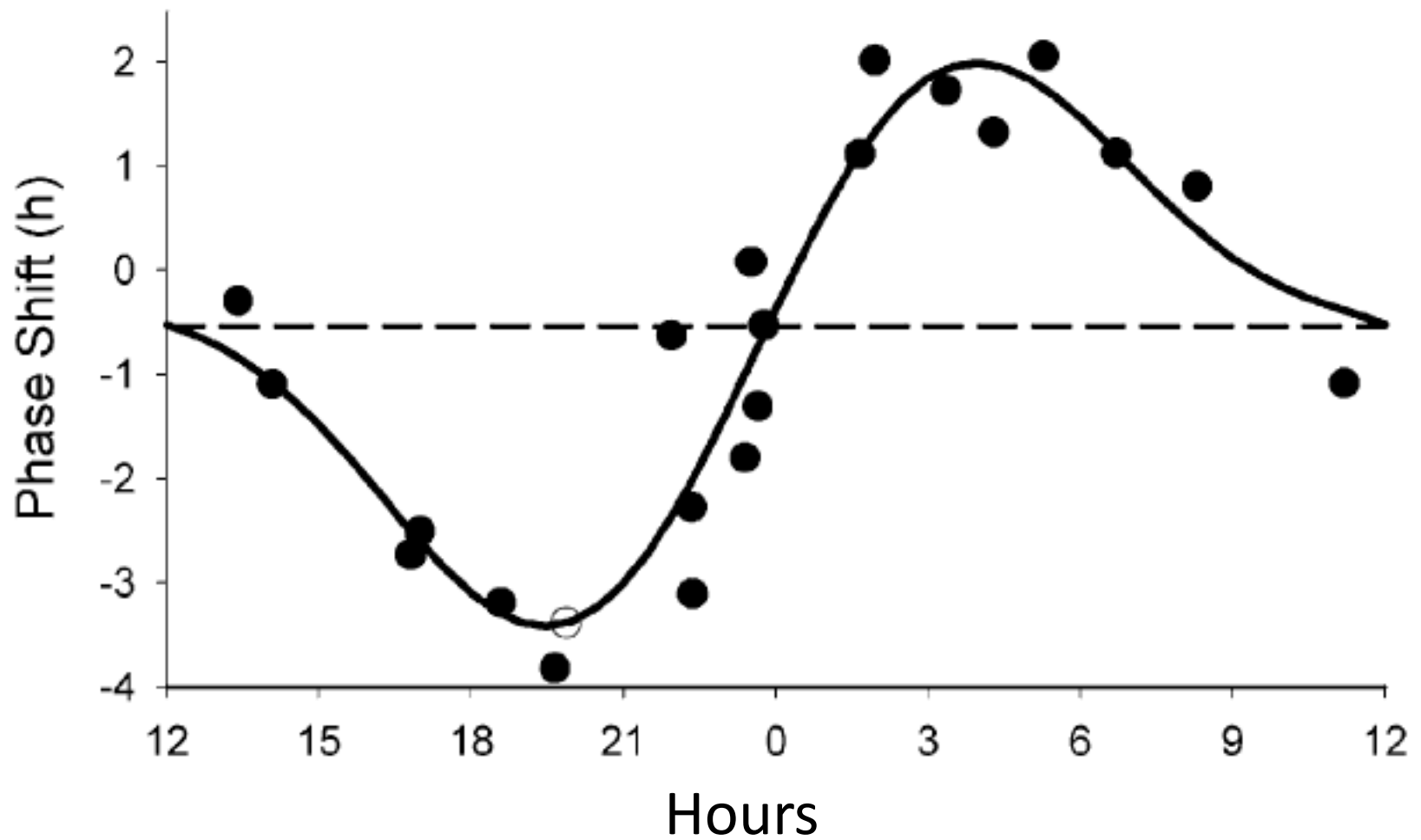
- Timing relative to the circadian clock

- Assessing circadian phase of the individual patient
- The phase-response curve for light

# Resetting the Circadian Clock: The Phase Response Curve (PRC)



From Martin Moore-Ede et al., *The Clocks That Time Us*, Harvard Univ. Press



From the lab of Sat Bir Singh Khalsa, Harvard

Lark

9 PM

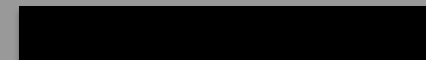
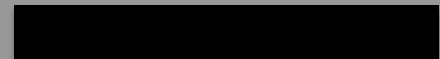
5 AM



Owl

1 AM

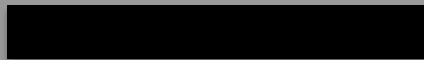
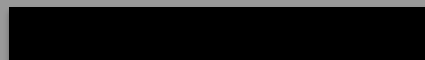
9 AM



Delayed Sleep Phase Disorder

4 AM

12 PM

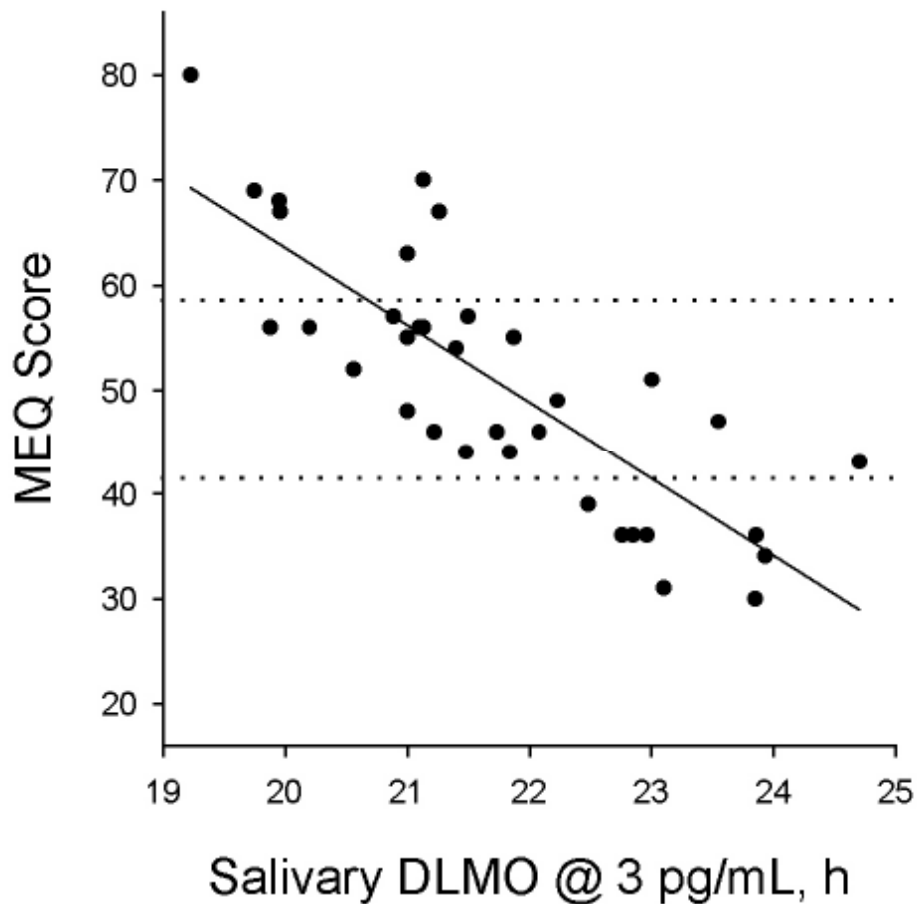




# Note to Self:

Switch to Excel analysis of group chronotype

# The Horne-Östberg Morningness-Eveningness score corresponds to melatonin onset phase.



MEQ Score	Start Light
16-18	8:45
19-22	8:30
23-26	8:15
27-30	8:00
31-34	7:45
35-38	7:30
39-41	7:15
42-45	7:00
46-49	6:45
50-53	6:30
54-57	6:15
58-61	6:00
62-65	5:45
66-68	5:30
69-72	5:15
73-76	5:00
77-80	4:45
81-84	4:30
85-86	4:15

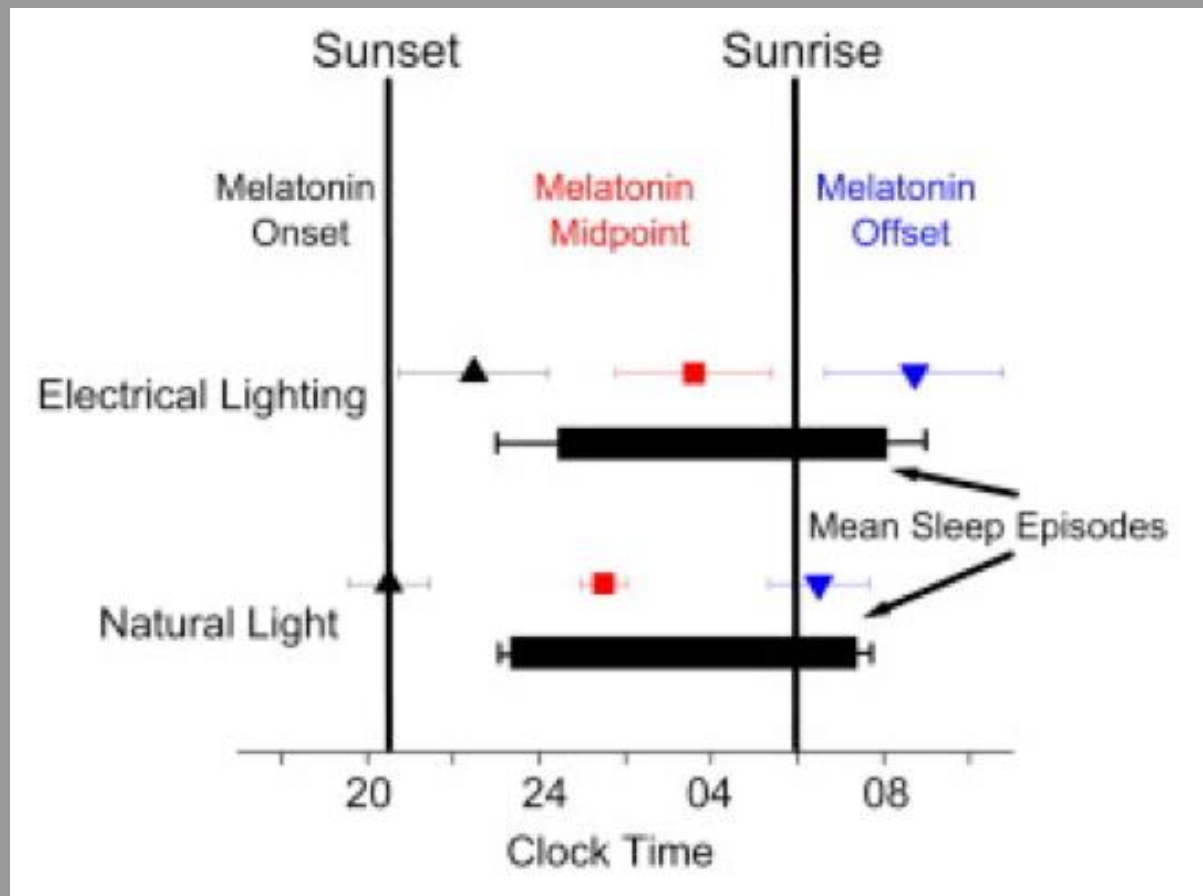
- Facing Reality:  
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- Light + antidepressants,  
hypnotics, antipsychotics,  
stabilizers

- Masking the rhythm :-\\
- Compatibility
- Necessity

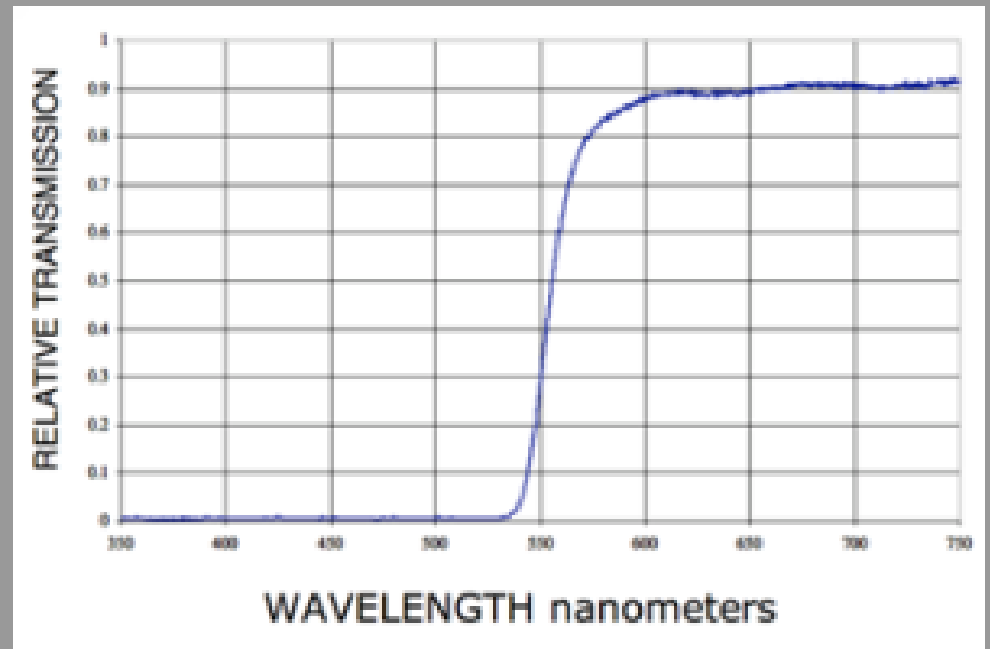
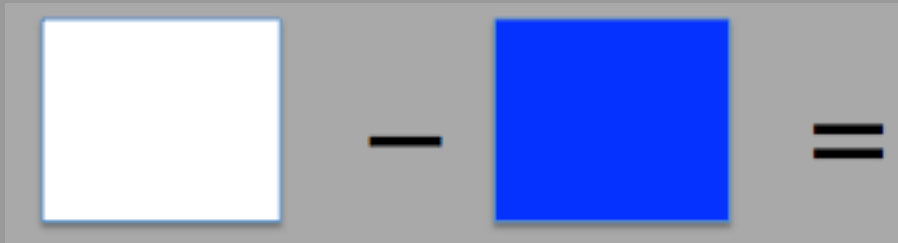
- Light and dark

- Circadian darkness  $\neq$  lights out
- Melatonin: maybe next year....



Lab of Kenneth Wright, University of Colorado





## Benefits

- Protect melatonin onset
- Reduce sleep onset insomnia
- Antimanic (?)

daytime  
6000 Kelvin

f.lux  
www.justgetflux.com



dusk  
2700 Kelvin

## The Chronotherapeutics Forum

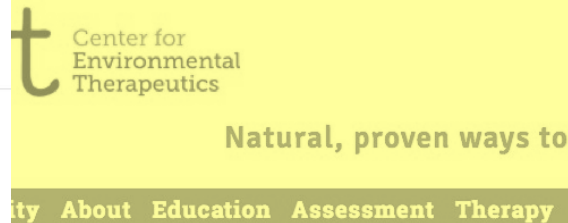
Join in discussion, debate, brainstorming and mutual support for doctors, mental health professionals, and chronobiologists.

Members share experiences, and solve puzzles together.

This forum is restricted to doctors, psychiatrists, psychologists, other mental health professionals, and chronobiologists with a clinical bent.

The forum is privacy-protected: Posts are not for distribution and cannot be googled.

Because the forum is designed to stimulate interaction among the caretaker peer group, those without direct clinical responsibility (e.g., industrial or university R&D, manufacturing or marketing) are not included.



nighttime  
1700 Kelvin

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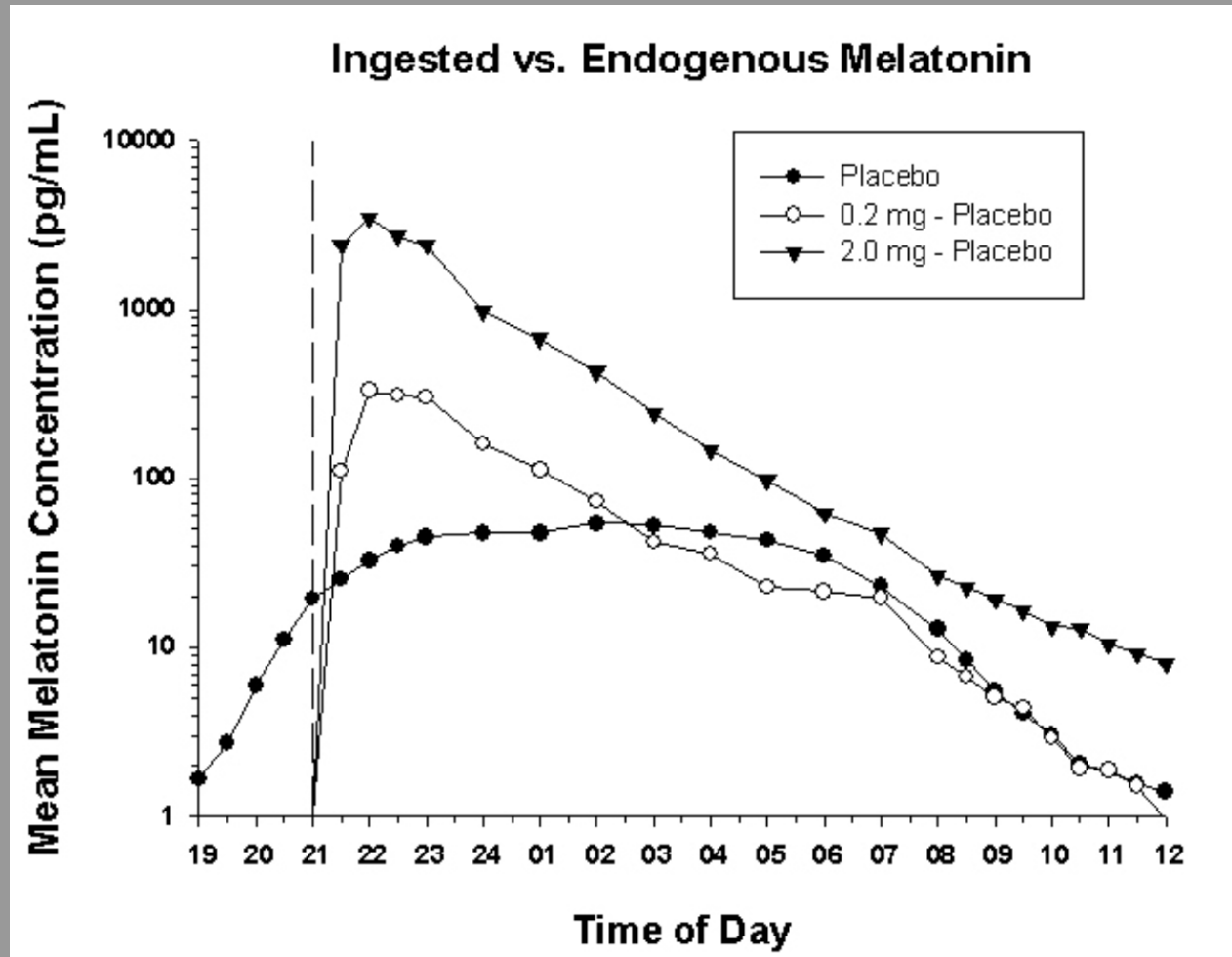
Because the forum is designed to stimulate interaction among the caretaker peer group, those without direct clinical responsibility (e.g., industrial or university R&D, manufacturing or marketing) are not included.

*Join our clinicians' forum!*

- Light and dark

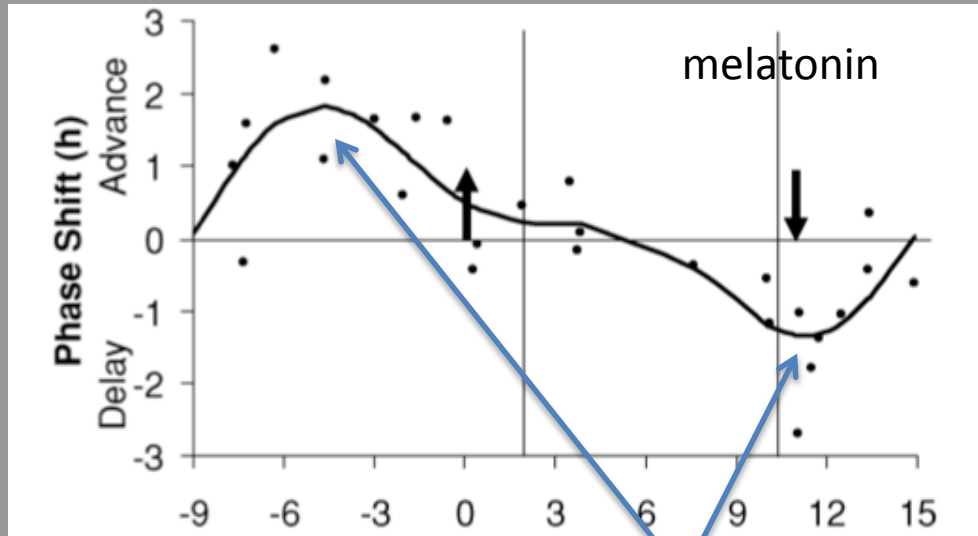
- Circadian darkness  $\neq$  lights out
- Melatonin: maybe next year....

# Physiologic vs. Supraphysiologic Melatonin Dose

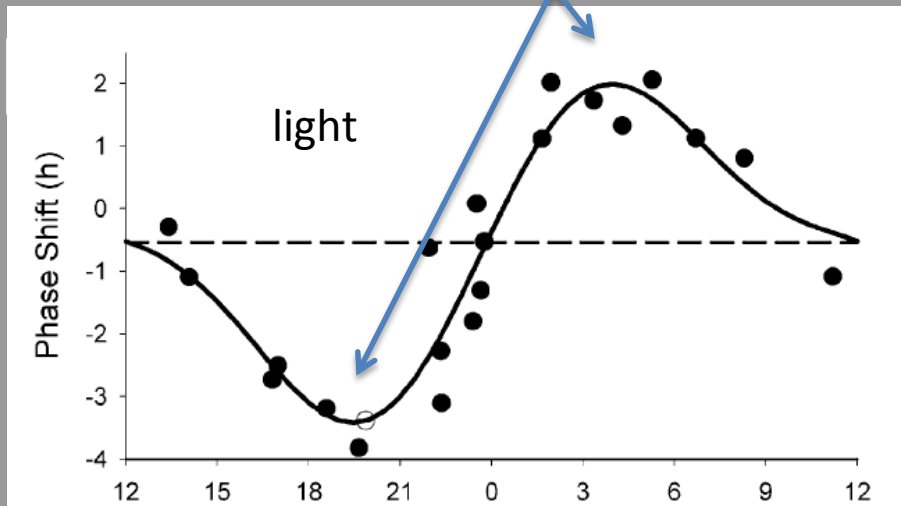


From the Terman lab, Columbia

# Phase Response Curves to Melatonin vs. Light



Burgess,  
Rush-Presbyterian-St. Luke's



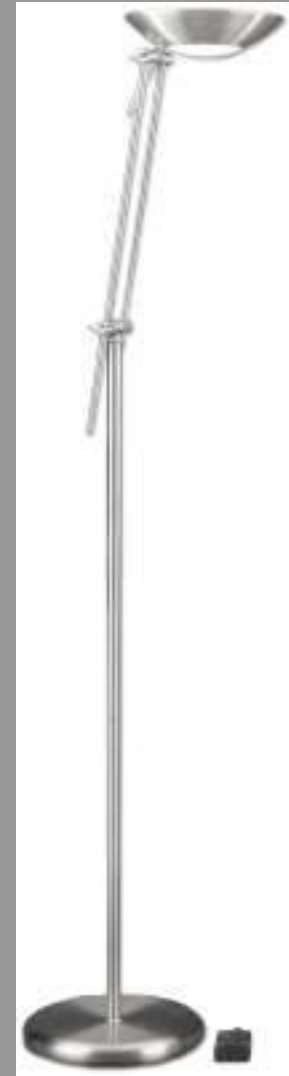
Khalsa, Harvard

- Mild vs. extreme  
circadian phase delay
  - Genetic vs. environmental causes
  - Delayed and depressed (or not)
  - Motivational roadblocks for treating DSPD in adolescents and adults



- Dawn simulation vs.  
bright light therapy

## Dawn Simulation System – R.I.P.



# PER2LED Smart Lamp



The Per2 Smart Lamp is the first integrated dawn, daylight, and dusk simulator to provide gentle bedside illumination programmed to guide your sleep and waking with LED signals that span the range of twilight through sunrise. Lightweight and cleverly designed, you can use the arm and lamp housing swivels to position the arm the illumination to match your specific bed and night table arrangement.

The system is programmable to set the timing for a regular daily rise time, with the light smoothly increasing over a half-hour interval at the end of your sleep period, and remaining at maximum intensity until to you rise and leave bed for the day. This morning light is bright white and energizing, a distinct benefit for people who usually still feel sleepy when the alarm goes off, and want to use a snooze button. According to research in Dr. Michael Terman's lab, dawn simulation can signal your inner clock to shift your circadian rhythm a bit earlier, easing the "lazy wake-up" problem. This is an optimal solution, since snooze buttons typically wake you up in the middle of a sleep cycle, sometimes leaving you feeling more tired than you were when the alarm first went off.

When used in the evening before sleep, the Per2 Smart Lamp provides a lower-level light signal, with a milder hue, to assist sleep onset if you tend to stay up later than you should. Dusk begins with a button press as you get into bed.

Placement of the LED housing – by swiveling the arm and lamp units – should be done with forethought: You want to maximize the light received at your eyes while lying on your pillow, taking care to prevent a direct view of the bulbs, which become very bright as the dawn signal approaches daylight. Don't make the mistake of trying to maximize illumination by turning the ultra-bright LEDs toward your eyes, which might produce glare avoidance and squinting.

If you want general room illumination during the day, the system can present a medium daylight hue, bridging dawn and dusk. If you're out of the bedroom during the day, don't select this option.

## Recommended lamp positions for dawn and dusk simulation



Bent toward the bed



Reflected off bedside wall

- **Light therapy** as a component of Triple Chronotherapy
  - A night of total sleep deprivation (“wake therapy”)
  - Recovery sleep begins earlier on subsequent nights (“sleep phase advance”)
  - Light therapy begins daily after the first wake therapy night.

# Total Sleep Deprivation

Day	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p	12a	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12p
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								

Wake	Sleep

# Phase Advance of Sleep\*

Day	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p	12a	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12p
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								

Wake

Sleep

*\*This does not necessarily imply a phase advance of the circadian clock!*



# Sleep Phase Shifts

**Phase shifts happen to most of us. Examples include:**

- Flights across time zones
- Daylight savings (National Jetlag Awareness day)
- Shift work

## **Sleep Phase Advance**

- Bringing the sleep period to an earlier time.

## **Sleep Phase Delay**

- Pushing the sleep period to a later time.

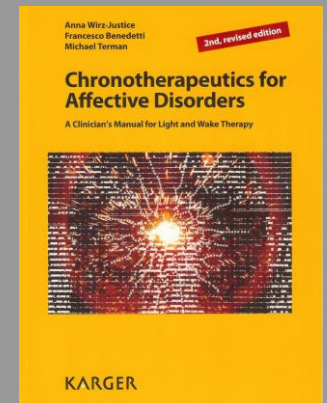
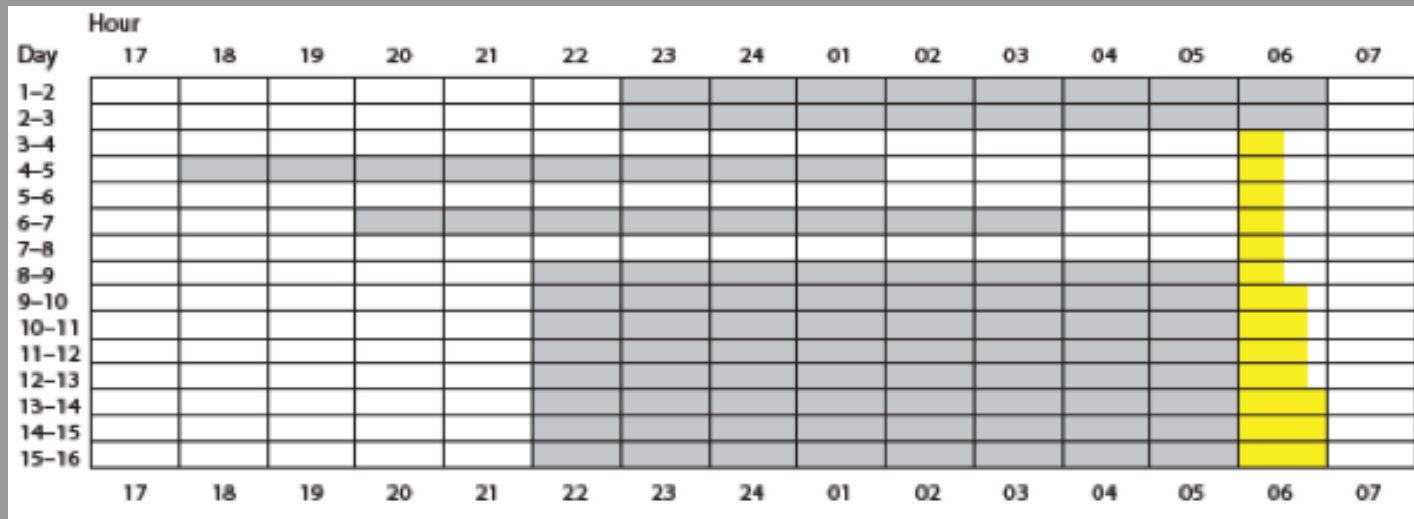
# 3-Day Sleep Phase Advance

Day	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p	12a	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12p
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								

Wake	Sleep

A fully-elaborated protocol\* intersperses **three nights of wake therapy** with phase advanced recovery sleep.

*\*implemented on an individual basis if the patient has not shown immediate improvement.*



# Our MUSC Clinical Trial

## Triple Chronotherapy (Combined Total Sleep Deprivation, Sleep Phase Advance, and Bright Light Therapy) Rapidly Improves Mood and Suicidality in Suicidal Depressed Inpatients: An Open Label Pilot Study

Gregory L. Sahlem MD, Benjamin Kalivas MD, James B. Fox MD, Kayla Lamb BS, Amanda Roper MD, Emily N. Williams MD, Nolan R. Williams MD, Jeffrey E. Korte PhD, Zachary D. Zuschlag DO, Salim El Sabbagh MD, Kelli Barth DO, Thomas W. Uhde MD, Mark S. George MD, E. Baron Short MD MSCR

Journal of Psychiatric Research 9/2014

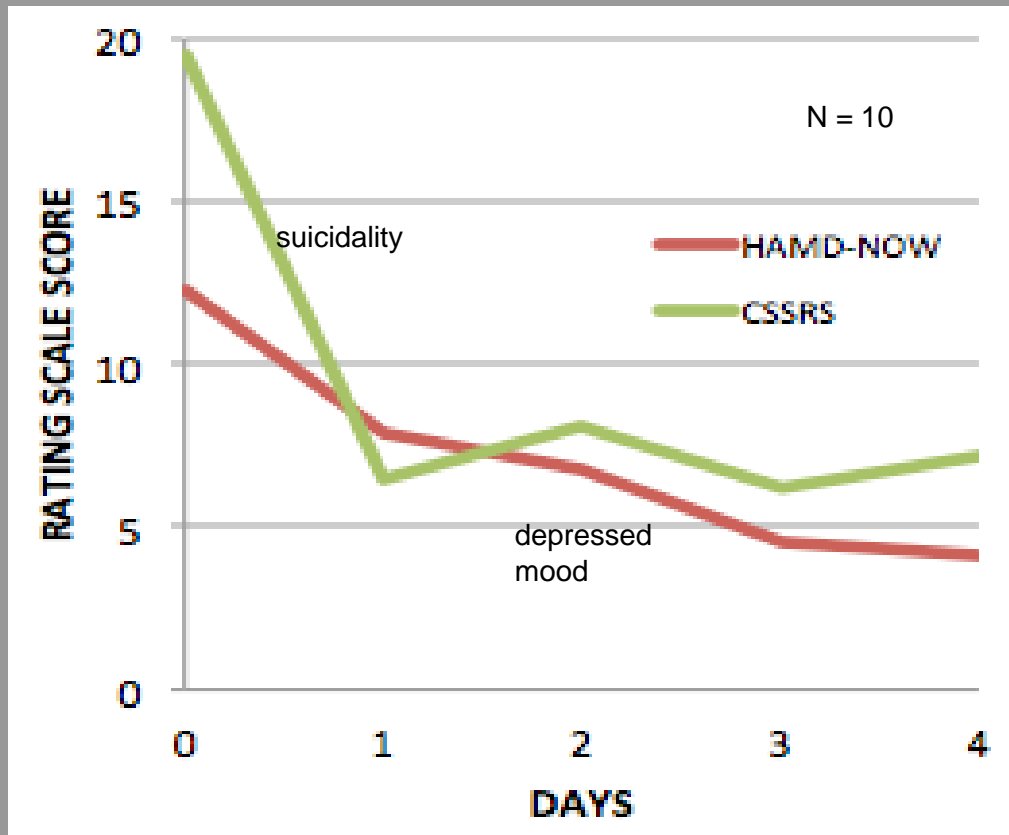
## Our Protocol

Day	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p	12a	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12p
Pre																								
0																							X	
1																							X	
2																							X	
3																							X	
4																							X	
Post																								

Wake	Sleep	Light	Assessment
			X

# Triple Chronotherapy

## The South Carolina Study



Gregory Sahlem & colleagues  
Department of Psychiatry  
Medical School of South Carolina

In press, 2014  
Journal of Psychiatric Research

# Medical/Medication Considerations

## **Unipolar Depression**

- Pt should be on an antidepressant (TCA, SSRI, SNRI's)  $\pm$  Lithium

## **Bipolar Depression**

- Lithium first line (0.8-1.0)
- If not on lithium must be on some type of mood stabilizer/atypical neuroleptic. (Switch rate on 1.5%, Switch rate off 5%)

## **Hypnotics/Highly Sedating medications**

- Hold/reduce dose during the night of total sleep deprivation.
- Adjust timing of dose on nights of sleep phase advance.

# Staffing Considerations

## **Normal unit staffing should be sufficient**

- No need for 1:1
- Staff should know to be encouraging and helpful.

# Unit Considerations

## **Patient's room should be**

- A single room (because they will be sleeping on an atypical schedule)
- As far from the normal milieu as possible (to avoid sleep disruption from normal unit noise)
- Dark – especially during times when sunset occurs after 6pm. Alternatively, eye shades can be used.



# *27th Annual Meeting*

## Society for Light Treatment & Biological Rhythms

**Saturday, June 27 – Sunday, June 28, 2015**



### **Planned Symposia**

- Wake Therapy, Melatonin
- Attention Deficit Hyperactivity Disorder
- Chronobiotic drugs

**Venue:** Sanford Consortium  
Roth Auditorium, UCSD

**Hotel:** Estancia Hotel & Spa  
<http://estancialajolla.com>

**SLTBR President**

**Klaus Martiny, MD, PhD**

Copenhagen University Hospitals  
Psychiatric Centre Copenhagen  
Denmark



Region  
Hovedstaden

*[sltbr.org](http://sltbr.org)*

**Academic & Local Host**

**Michael Gorman, PhD**

Center for Chronobiology  
Department of Psychology  
University of California, San Diego



Center for  
**CHRONOBIOLOGY**  
UCSD