Circadian Rhythm Sleep Disorders

Circadian Rhythm Sleep Disorders (CRSDs) are sleep problems in which a person's internal sleep-wake cycle does not line up with the times in their schedule when they need to be asleep or awake. Unlike other sleep problems (such as sleep apnea), CRSDs do not affect the quality of your sleep, but rather cause you to be sleepy when you need to be awake and awake when you need to sleep.

Are there different types of CRSD?

There are several types of CRSDs. They include delayed sleep phase, advanced sleep phase, jet lag, shift work disorder, free-running and irregular sleep-wake type. All types stem from the fact that our tendency to be sleepy or alert is to some degree regulated by a part of the brain that acts like a clock. This "clock" is reset on a daily basis by exposure to bright light and other regular activities such as meals or exercise. CRSDs occur when the sleep-wake cycle of our internal "clock" is different from the sleep-wake schedule we would like to follow.

Delayed Sleep Phase

If you have the delayed sleep phase type of CRSD, you are a "night owl". You have difficulty falling asleep at a "normal" bedtime but go to sleep late (2 AM or even later). Because you still need your normal amount of sleep, you end up sleeping until later in the day. This is common in teens and young adults, but can be seen in any age group. This type of CRSD is not considered a "disorder" unless your sleep schedule causes you problems like being late for work, school or social events.

Advanced Sleep Phase

The CRSD that is the opposite of the delayed sleep phase disorder is the advanced sleep phase disorder. If you have this disorder, you are an "early bird" or "morning lark". You prefer an early bedtime (6 to 9 PM) and wake up early in the morning, usually after a normal amount of sleep time. Advanced sleep phase is frequently seen in the elderly, but also occurs in younger age groups. In the elderly, this change in sleep timing is thought to result from age-related changes in the brain, while in younger people the tendency appears to be inherited. Just as in delayed sleep phase type, advanced sleep phase type is not considered a "disorder" unless it interferes with your desired or required sleep-wake schedule.

Jet Lag

Traveling from one time zone to another can cause jet lag. Jet lag occurs because your internal "clock" remains set to the sleep-wake cycle of your original time zone. The main symptoms of jet lag are difficulty falling asleep at a bedtime that is normal for the new time zone and sleepiness during the day of the new time zone. Jet lag lessens as your internal "clock" resets to the new times of day and night. On average, our internal "clock" can shift about 1-2 hours each day, but some people handle time zone changes better than others, a trait that may be inherited. Older individuals tend to suffer more from jet lag than those in younger age groups.

Shift Work Type

Changes in the timing of your work shift can cause a CRSD called shift work type. Work schedules that require you to be awake during your normal sleep time and asleep during the normal hours you are awake, may cause sleepiness and poor performance during your working hours and difficulty sleeping during your daytime sleep period. Like jet lag, people differ in their ability to adjust to shift work. If you will keep the same work schedule over long periods of time, the solution is to follow the same sleep-wake times during days off as are required for the work shift so that your internal "clock" resets to this new schedule. This may be difficult due to family and social factors. Adjusting your internal clock is even more of a problem if you frequently rotate shifts.

Free-running Type

The CRSD known as free-running type or non-24 hour sleep-wake disorder can occur for many reasons. The most common cause of non-24 is blindness, but other causes include changes in light sensitivity, environmental factors, and hormonal factors. With this problem, your preferred sleep period changes daily, usually shifting 1-2 hours later each day. For unknown reasons, your internal "clock" tends

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to maintain a 25-hour "day". With this disorder, resetting the "clock" does not happen unless attention is paid to other factors such as meals and other activities that can help reset the "clock."

Irregular Sleep-wake

The last CRSD, irregular sleep-wake type can occur for several reasons. For example, irregular sleep-wake can occur when your exposure to bright light or daily activities vary (or are entirely missing), and when there are age-related changes in the brain (senile dementia). Without a set schedule, you may doze on and off throughout each 24 hour period. This problem is common in people who live in nursing homes and for those with an extremely disorganized living pattern.

Why is it important for me to know if I have a circadian rhythm sleep disorders?

CRSDs can make it harder for you to get high quality, refreshing sleep. Untreated CRSDs and increased sleepiness can increase your risk of accidents such as car crashes. They may also raise your risk of having heart attacks and diabetes. (Also see ATS Patient Information Series fact sheet on Obstructive Sleep Apnea and Heart Disease.) CRSDs may lead to poor work performance, social stresses and depression.

How do I know if I have a circadian rhythm sleep disorder?

You may have a CRSD if you find it hard to fall asleep during "normal" sleep times and you are sleepy at times when you should be awake. If your sleepiness is causing difficulties with work, school, or socially, you should be evaluated by a sleep specialist. Before seeing the sleep specialist, keep a detailed sleep history and a sleep log for 1 to 2 weeks. This will help the specialist determine if your sleep problem is from a CRSD or due to another sleep disorder or medical issue.

How are circadian rhythm sleep disorders treated?

Treatment varies depending on the specific CRSD. The goal of treatment is to fit your sleep pattern into a schedule that allows you to meet the demands of the lifestyle you want. Therapy usually includes several approaches:

- Allowing enough time for sleep
- Keeping regular bedtimes and wake up times (including days off)
- Adjusting your wake up time until you can fall asleep at the time you want
- Avoiding taking naps if you have difficulty falling asleep at your desired bedtime
- Sleeping in a dark, cool, quiet room
- Avoiding caffeine and alcohol within six hours of bedtime
- Taking melatonin (available over the counter) may be helpful in certain situations as recommended by your health care provider
- Using bright natural or artificial light soon after your desired wake up time, and scheduling meals and activities at regular times to help reset the sleep-wake cycle but avoiding bright light near bedtime

Different combinations of these treatments are used for the different CRSDs. Having good sleep habits will improve your CRSD symptoms. It is very important to keep regular wake up times and bedtimes. Often, CRSDs can be treated with simple solutions that result in your being awake and alert when you wish and able to sleep when required. You should contact your health care provider for guidance if you think you have a CSRD.

Things you might do to help evaluate your CSRD are:

Step 1. If you are having difficulty falling asleep or staying awake, consider whether this is due to "bad habits" or a situation that will resolve by itself (e.g. travel to another time zone).

Step 2. Review the treatments for CRSDs listed above.

Step 3. Ask for a referral to a sleep specialist if these suggestions don't work. It is especially important to get evaluated if your sleepiness is affecting your safety such as falling asleep while driving or you're your ability to function (unable to stay awake at work).

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Rx *Action Steps*

It is especially important to get help from your healthcare provider or a sleep specialist if you:

- ✔ find yourself sleeping when driving or using dangerous equipment
- ✔ fall asleep at times that are not normal (at work or school)
- ✔ are unable to wake up in time for work, school, or other activities
- ✔ are unable to fall asleep within 1 hour after going to bed

Healthcare Provider's Contact Number:

References:

American Thoracic Society
- http://www.thoracic.org/patients/

American Academy of Sleep Medicine
- http://yoursleep.aasmnet.org/Hygiene.aspx

National Institute of General Medical Sciences
- http://www.nigms.nih.gov/Education/Factsheet_CircadianRhythms.htm

Artificial Bright Light Therapy for Circadian Rhythm Sleep-Wake Disorders

Circadian rhythm sleep-wake disorders (CRSWD) may occur when the body's internal clock is out of step with environmental cues. This may lead to problems with the timing of the sleep-wake cycle. Types of CRSWD include delayed sleep phase, advanced sleep phase, jet lag, shift work disorder, free-running and irregular sleep-wake type. The use of bright light therapy can help to treat CRSWD.

The most common source of bright light in our environment is the sun, however, sunshine is not always available wherever and whenever it is needed. Artificial sources of bright light have been developed and may be used for treatment of CRSWD. This fact sheet describes bright light therapy and how to use it. For more information on CRSWD, go to the ATS Patient Information Series at https://www.thoracic.org/patients.

How does bright light therapy work?

The amount of bright light you receive depends on how bright the light source is (lux) and how far away you are from it. The higher the lux level the brighter the light exposure. When you are outside on a sunny cloudless day, you may be exposed to up to 100,000 lux. When outside on a rainy day, you still may be exposed to 1,000 lux. Indoor light usually has levels of 100-200 lux, but may be as low as 40 lux during the evening hours. A bright light box may put out 10, 000 lux, but the amount of lux received by a person who is sitting two feet away from the device is closer to 3,000-5,000 lux. The amount of lux put out by a bright light device is usually measured at the device itself. The manufacturer's instructions will let you know the intensity of the light box.

What type of artificial bright light device can I use?

Light boxes or wearable devices, such as light visors or light glasses, can deliver artificial bright light therapy. Light visors or light glasses, worn on the head are easily portable, thus are ideal while doing household activities.

Some devices are marketed as blue light or blue-enriched white light therapy, but these do not have any advantages over a white broad-spectrum (all colors included) light therapy device. Make sure your light therapy device has an ultraviolet (UV) filter. Do not use tanning lamps, heat lamps, or UV lamps for bright light therapy as they may be harmful to your eyes or skin.

Light boxes come in a variety of sizes. A larger light box generates a larger field of light, but may be difficult to move around and may take up too much space in your home. A smaller light box is more portable, but generates a smaller field of light and it is easier to move out of its effective range.

How do I use my artificial bright light device?

Your healthcare provider will recommend how much light exposure you need (lux and length of the light therapy session) and what time of day you should have it. Light therapy sessions usually last 30-60 minutes. Your healthcare provider may also suggest

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avoiding bright light at certain times of day.

You will want to make sure that you are sitting at the same distance from the light box for every bright light therapy session. A good way to do this is to tape a 2-foot long string to the base of the light box. You will want to pull the string out to the level of your eyes and sit at that distance from the light box.

Do not stare directly at the light box.

Reading or eating are ideal activities while having your light therapy treatment. You may want to watch television or use a computer while undergoing bright light therapy. In this case, two light boxes may be set up at an angle on either side of you to make sure you are receiving the correct amount of bright light in both eyes.

You should always turn on your indoor lights and do not close your eyes while having your bright light session. It is best not to nap right after bright light therapy, since a nap can interfere with the helpful effects of the bright light.

What are the side effects of artificial bright light therapy?

Most of the side effects of bright light therapy are fairly mild and usually resolve over time. Common side effects include, eye irritation, nausea, headache, dizziness, and agitation (feeling anxious or nervous). A rare side effect of bright light therapy in persons with bipolar disorder is mania (inappropriately elevated mood- sometimes with irrational thinking) or hypomania (a milder form of mania).

What precautions do I take when receiving bright light therapy?

If you are taking a medication that can cause photosensitivity (a reaction to light with a skin rash or sunburn), do not start on bright light therapy without talking to your healthcare provider. These medications may include lithium, melatonin, certain antibiotics, and isotretinoin. You may also need skin examinations by a dermatologist while receiving bright light therapy. If you have eye disease such as glaucoma, macular degeneration, cataracts, or eye disease related to diabetes, you may need monitoring by your ophthalmologist (eye specialist).

People who have migraine headaches that are caused or made worse by bright light may not be good candidates for bright light therapy. Talk with your psychiatrist before using bright light therapy if you have been diagnosed with bipolar disorder.

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Rx *Action Steps*

- ✔ Talk to your healthcare provider about how and when to use your light therapy device and the amount of light exposure you need.
- ✔ Let your healthcare provider know if you have side effects from artificial bright light therapy.
- ✔ Do not use tanning lamps, heat lamps, or UV lamps.
- ✔ Keep your eyes open but do not stare directly at the source of artificial bright light.
- ✔ Do not take a nap right after a bright light therapy session.

Healthcare Provider's Contact Number:

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For More Information

National Institute of General Medical Sciences
- https://www.nigms.nih.gov/education/Pages/Factsheet_CircadianRhythms.aspx

American Thoracic Society
- https://www.thoracic.org/patients/patient-resources/resources/circadian-rhythm.pdf

American Academy of Sleep Medicine—Sleep Education
- http://sleepeducation.org/treatment-therapy/bright-light-therapy/overview