



This article is a summary of the lecture by Dr. Jo Solet, Harvard Medical School researcher and sleep expert, presented to the Massachusetts CFIDS/ME & FM Association (MassCFIDS) on April 6, 2013. The event was co-sponsored by the Massachusetts Department of Public Health and held at the Hinton State Laboratory Institute Auditorium in Jamaica Plain, MA.

Photo shows Charmian Proskauer, President of MassCFIDS (on far left) with Nancy Smith and Rita Sanderson, Events Committee Coordinator and Assistant Coordinator on either side of Dr. Jo Solet.

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Identifying interacting drives for sleep

Circadian and diurnal rhythms

Dr. Solet introduced her lecture with a picture of a lunar moth attracted to the light explaining that the moth has evolved with diurnal rhythms (meaning day/night rhythms). She then displayed a picture of a store open 24 hours and used that as an example of how our changing lifestyle has wreaked havoc on our own diurnal rhythms. In the past, she explained how circadian rhythms were in sync with normal exposure; when it got dark outside, people would go to sleep. Today, we live in a 24-hour society in which circadian rhythms can be undermined by artificial light and technology, which manifests as disrupted sleep patterns. Dr. Solet listed some of the culprits that we don't even think about such as: electric lights on all the time, a culture of overwork, open 24/7 technology, insufficient exercise, a café on every corner where people can tank up to stay awake and can be tempted by treats that increase extra calories without realizing it, and the fact that people are limiting their sleep.

She raised the question “What are the drives that are being affected by our changing lifestyle, by this natural experiment we've undertaken, where we don't have the normal exposure to light and balanced circadian rhythms?”

What regulates sleep/wakefulness

Wakefulness is regulated by two processes—Homeostatic and Circadian drives. The homeostatic drive for sleep and waking are neurobehavioral and physiological functions. The longer you are awake, the greater your homeostatic drive for sleep becomes. The circadian drive, the night day light cycle, also drives sleep. Dr. Solet explained that when it is brighter, we are more alert. As an example, she used the case of someone staying up all night and perhaps at about 3 am getting really tired but then by 8 am getting a burst of energy, but by late afternoon the person wasn't doing so well. It is just the overlap of circadian rhythms that causes that effect. She presented a slide that had a graph of the circadian and homeostatic sleep timelines showing where they overlapped.

Individual differences/Chrono-types

In addition to the above processes, sleep is influenced by people's inclination toward greater alertness in morning or evening; those two types are called Chrono-types. It is believed to be a biological proclivity that people are prone towards one or the other. People who stay up late are frequently called night owls, while those who get up very early are larks.

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Understanding the elements of sleep architecture

Sleep cycles through the night

A hypnogram/sleep architecture chart that is color coded, showed the continuous sleep cycles. Each cycle lasts about 90 minutes. Starting at the wakeful state, a person then goes into progressively deeper sleep known as Delta, then back up toward lighter sleep, closing the 90 minute cycle with REM (rapid eye movement, also called dream sleep). The color coding shows that the duration of each stage varies as the cycles proceed during the night's sleep, such that upon falling asleep, a person spends more of the 90 minute cycle in deep sleep, and by morning, much a greater proportion of time is spent in REM. Dr. Solet mentioned that up until 1929, when the Electroencephalogram (EEG) was invented, researchers thought when a person went to sleep, there was no brain activity and considered it a dead zone period. With the results of the EEG, which measured the electrical activity of the brain, researchers discovered that the brain is very active during sleep and that challenged the thinking of the day. Scientists and researchers had to rethink what they thought they knew about sleep.

What defines the sleep stages □

During sleep studies, the person's brain is hooked up to an EEG and the brain-wave activity is measured. Each stage produces certain brain-wave activities that define the stage. Therefore, researchers can tell which stage of sleep the person is in by looking at the frequency and amplitude of the waves.

Need for sleep changes during development. A sufficient night of sleep for children should be around 10-12 hours. For adults, somewhere between 7.5 and 9.5 hours is good. Very few people are natural short sleepers. Many adults run on 5-6 hours of sleep and think this is not a problem. Most are really sleep-deficient and not operating at their best, especially if limited sleep has been a lasting behavior.

Muscle paralysis during dreams

Researchers are always studying sleep and there have been many discoveries. Most people, while dreaming, have muscle paralysis, which is normal and prevents people from acting on their dreams. There are a few conditions that Dr. Solet did not elaborate on where people get up during the dream state. By depriving research subjects of sleep, researchers have learned about the important contributions of sleep and that different sleep stages may serve different restorative requirements.

Positive sleep effects

Sleep produces positive effects on memory, problem-solving and creativity, enhancing integration and extraction. There are many reported cases of a person wrestling with a problem and falling asleep and by morning, waking with a solution. Research has shown that well-slept people are more likely to produce a creative answer to a problem than those who are not well-slept. Sleep has a consolidating effect and enhances learning. Dr. Solet stated "It is most efficient to give some of your time to sleep." Babies are sleeping 18 hours a day, half of which is spent in dream stage. As people get older, sleep changes and the quality of the sleep changes, with the proportion of deep sleep decreasing.

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Common Sleep Terms and Acronyms

Commonly used acronyms:

ES= Excessive sleepiness

TIB= Time In Bed

TST= Total Sleep Time

Sleep Efficiency= TST/TIB

Sleep Latency= Period before falling asleep

WASO= Wake After Sleep Onset

SWS= Slow Wave (deep) Sleep

REM= Rapid Eye Movement Sleep

Sleep Inertia= Post-wake “fog” before full alertness

PSG= Polysomnogram, measure brainwaves

Actigraphy= Sleep assessment through motion tracking wrist device

PMR= Progressive Muscle Relaxation

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How sleep changes over one's lifetime

Changes in sleep with aging

Dr. Solet explained that with age, sleep becomes lighter with more night awakenings. Sleep latency is how long it takes you to fall asleep—this doesn't change much with aging. CFS and FM patients complain that they have trouble falling asleep, so that they have increased sleep latency. What does change in aging is WASO, and as age creeps up, waking becomes more frequent and then it is a question of how the person handles that and how they help themselves get back to sleep. REM only decreases somewhat with aging. What changes the most dramatically is restorative sleep, the deepest sleep. The proportion of deep sleep lessens with age. Dr. Solet believes the secret to the fountain of youth could be in finding a way to increase this deep slow-wave sleep. Sleep efficiency is defined as the proportion of Time in Bed (TIB) to Total Sleep Time (TST). Typically activity and morning light exposure are sleep enhancing, but if you stay in because you are ill, you are not getting either of those. With CFS and FM patients, post-exertional malaise has to be considered and activity measured.

Adulthood effects on sleep

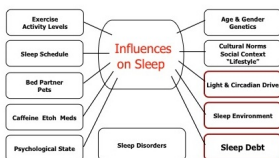
Dr. Solet showed a slide that presented some of the issues effecting sleep in adulthood. It listed the following:

- Menstrual cycles can effect sleep efficiency
- By the age of 20-30 years old, deep sleep diminishes by about half and continues to diminish with age
- Self-care opportunities may decline
- Family and work responsibilities peak
- Incidence of sleep disorders increases
- For women, hot flashes during menopause can disrupt sleep
- Daily life structure can be lost with illness and/or retirement
- TIB may increase while TST decreases
- Physical activity and light exposure may become limited
- Pain and medications may effect sleep

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Sleeping patterns and sleeping conditions

Influences on Sleep chart



Jo M. Solet, PhD 2011

Factors that influence sleep

Dr. Solet explained each of the following and how it can play a role in sleep issues. One of her examples was a college student living in a dormitory and how, if she is a morning person, she may have a problem if late night noise in the dorm doesn't allow her to get to sleep. Some sleep influencing factors cannot be modified such as age, gender and genetics; others can.

Consistency in sleep schedule is helpful; the body actually needs that. The body used to be in sync with nature such that when the sun went down, you went to sleep. With today's 24/7 cycle, there are no clear lines and a person has to create her own. It is better to go to bed about the same time each night rather than a different time every night. Social jet lag is the term used to explain Monday morning fatigue for individuals who stay up late on the weekend and drag into work on Monday. If you are sleeping with a bed partner who disrupts your sleep, or is on a different schedule, it may be better to sleep alone and have visits. Pets should be trained not to

disturb your sleep. It is better to have a pet sleep on the floor and not the bed with you. Many pet owners don't even think about putting their pets out of their bedroom.

Many substances have effects on sleep. Caffeine is alerting and is sometimes used in combination with a short nap. Doctors will use this technique where they drink a strong cup of coffee and take a twenty-minute nap. When they get up, the caffeine has taken hold and it acts as a stimulant alone with the rejuvenation from the nap. Caffeine can and does affect sleep and it is not a good idea to drink it especially after noon, except for emergencies. The majority of CFS and FM patients may have alcohol intolerance and do not drink. Alcohol can initially be a sedative, but it decreases sleep duration and efficiency, suppresses REM, and increases WASO, especially in women. Benadryl, an over-the-counter antihistamine, is sometimes used as a sedative because it can cause drowsiness, but it inhibits SWS and REM sleep, leading to non-restorative sleep, lasting sleep inertia, rapid tolerance, and rebound insomnia.

Some influences on sleep are under our control, but others are not. The following is a bullet list for a quick check:

- Exercise and activity levels
- Sleep schedule
- Bed partner and pets
- Caffeine, alcohol and medications
- Psychological state
- Sleep disorders
- Age/gender, genetics
- Cultural norms/lifestyle
- Light and circadian drive
- Sleep environment
- Sleep debt
- Sleep disorders

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The risks of limited sleep

Epidemiological risks of insufficient sleep

In explaining the epidemiological evidence, Dr. Solet showed a slide that had a color-coded map of the United States showing the age-adjusted percentage of adults who reported 30 days of insufficient sleep or rest. Massachusetts has room for improvement. There are two groups that are at special risk of being under-slept: the under-resourced who may be living in conditions beyond their control and the over-committed and ambitious who may take on more than is possible. These maps from The Centers for Disease Control and Prevention (CDC) showed an intersection in epidemics in the states of the under-slept with a high incidence of diabetes and obesity. In discussing obesity, insufficient sleep causes the appetite to increase and the satiation level to drop, leading to overeating. When you've been up all night, you will be hungrier. The people who have insufficient sleep will have a sleep debt. Just like having a credit card debt, the balance has to be paid off, in this case with sleep. Study citation: Jeffrey S. Flier and Joel K. Elmquist, PhD "A Good Night's Sleep: Future Antidote to the Obesity Epidemic?", *Ann Intern Med* . [editorial] 141, no. 11 (2004): 885-886. doi:10.7326/0003-4819-141-11-200412070-00014.

Physiological consequences of sleep debt

Leptin is a hormone that signals satiation. With insufficient sleep, Leptin levels drop and levels of ghrelin, which regulates appetite, increase. Ghrelin signals the body to turn on the hunger and fat store. This signals a negative energy balance, which in turn can increase hunger and lead to obesity. People think if they are up for a longer period of time, they will burn off the extra calories, but research has proven them wrong. When tired, many head for the refrigerator rather than for bed. They gain weight. There is also the possibility of immune cell activation and increased inflammation as well as irregularities in stress hormone regulation.

Dr. Solet made her point regarding food marketing practices by explaining how the recent analysis of portion sizes in cookbooks over the years shows increases and in general, how the food industry has supersized portions. The proliferation of fast food restaurants has contributed to the problem of obesity and grab and go eating. Research from the CDC (Obesity data from CDC; Sleep data from Roffwarg in *Science*, 1966, National Sleep Foundation polls, and from Hale, Lauren in the *Journal of Public Health*, 2005) showed the increase of obesity from 1960 to 2000, while at the same time the chart showed mean hours of sleep have been dropping between 1960 to 2000. In 1960 the average sleep duration was 8.5 hours. While the current average may be 7 hours, Dr. Solet said some research seems to indicate we may need closer to 9 hours of sleep. Another chart showing how much sleep pro athletes get indicates they sleep more than most people do. They are paid to be in their best form, which supplies extra incentive to get enough sleep. The chart makes the point that we need more sleep to maximize our own capacities. Studies cited: 1) Roffwarg H.P. et al,

“Ontogenetic Development of the Human Sleep-Dream Cycle,”

Science

152, no. 3722 (1966): 604-619. 2) Lauren Hale, “Who has time to sleep?”

Journal of Public Health

27, no. 2 (2005): 205–211. doi:10.1093/pubmed/fdi004.

Altered memory and cognition

Restricted sleep impairs vigilance. Lack of sleep causes poor choices, impacts memory and cognition. In a study (Van Drogen, *Sleep*, 2003) where the participants were rated on their vigilance after 8, 6 and 4 hours of sleep and then self-reported on how they thought they were doing, the 6 and 4-hour sleep-participants showed they thought they were doing better than their actual performance. They had no insight into the fact that their vigilance was so impaired. When people are repeatedly awakened during the night, Dr. Solet explained many will not remember any details because the memory is not fully online during sleep. She made the point that just because you are in bed for eight hours doesn't mean you sleep for eight hours. Along with arousals during the night, there is the sleep latency factor—the amount of time needed to fall asleep. Another good example of the sleep-deprived are the doctors who have been up and on call for more than 24 hours and then get into a car to drive home. A study in which Dr. Solet was a co-author, “Sleep Disruption due to Hospital Noises: A Prospective Evaluation”, found study subjects unable to accurately report how many times they had been awakened by noise during the night. However, Dr. Solet informed us this particular finding of not remembering accurately was not delineated in the findings because it was expected. Study citation: Buxton O.M. et al, “Sleep Disruption due to Hospital Noises: A Prospective Evaluation”, *Ann Intern Med* . 157, no. 3 (2012): 170-179. doi:10.7326/0003-4819-156-12-201208070-00472. Author information: Orfeu M. Buxton, PhD, Jeffrey M. Ellenbogen, MD, Wei Wang, PhD, Andy Carballeira, BM, Shawn O'Connor, BS, Dan Cooper, BS, Ankit J. Gordhandas, SB, Scott M. McKinney, BA, Jo M. Solet, PhD.

Review of effects of insufficient sleep

- Impaired attention and reaction time
- Decreased memory and concentration
- Worse mood, depression
- Impaired task completion
- Psychosocial difficulties
- (Higher) Risk of injuries and falls

- (Higher) Incidence of pain and inflammation
- Weight gain
- Diabetes
- Cardiovascular disease
- Increased consumption of healthcare resources

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Sleep changes commonly found in CFS and FM

Many CFS and FM patients report experiencing the above complaints and describe specific experiences with sleep. Disordered sleep has been studied in the general population and may shed light on mechanisms useful for improving the situation.

Subjective reports of sleep changes in CFS and FM patients

- Difficulty falling asleep
- Difficulty staying asleep
- Un-refreshing sleep

Complaints by CFS and FM patients that MAY be related to disordered sleep and are elements of the CDC case definition of CFS

- Post-exertional malaise
- Fatigue interfering with functioning
- Pain
- Impaired short-term memory

Tools for studying sleep

- **PSG** = Polysomnogram measures brainwaves EEG + EMG + EOG (Electro-ocular grams) and is done during a sleep study assessing brain wave activity, muscle activity and eye movement activity
- **Actigraphy** = Sleep assessment through a motion-tracking wrist device, an accelerometer, which then can be put into an algorithm to interpret
- **Oximetry** = Measurement of oxygen in the blood supply with a clip put onto the finger.

- **Video**
- **Questionnaires** = Self report of sleepiness, for example, have you fallen asleep watching TV or driving?
- **Diaries and Apps** = Facilitate tracking activities and behaviors

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Sleep research—challenges, findings, and future direction

Challenges in doing CFS and FM sleep research

Dr. Solet laid out a list of why doing sleep research especially with this patient population is difficult. Individuals must be found and be willing to sign on as study subjects. Diagnostic categories can be difficult to define and the clinical criteria and severity can vary. Pooled data can obscure differences and standard scoring periods of 30 seconds in sleep studies may not detect changes in sleep micro-structure. Adjustment to sleeping in the lab with equipment can be difficult, especially the first night. Subjects' awareness that they will be videoed and watched can increase stress. Multiple nights of testing are expensive and stressful for subjects. Primary sleep problems and other comorbid illnesses complicate conclusions. Dr. Solet said, "We tend to look for our lost keys under the street light because it is brighter there, but that doesn't mean that's where the keys are." Her analogy made clear that although the medical professionals have the tools to study certain issues, patients don't necessarily have a singular sleep issue to the exclusion of other issues.

Sleep changes in CFS and FM

Dr. Solet made the point that the research findings in studies are inconsistent, possibly due to the small number of people enrolled, a difference in study subjects, or that the study is so small it does not have the statistical power to be convincing. Dr. Solet cited a study conducted by Melinda L. Jackson and Dorothy Bruck, "Sleep abnormalities in Chronic Fatigue Syndrome/Myalgic Encephalomyelitis: A Review", *J Clin Sleep Med* 8, no. 6 (Dec. 15, 2012): 719-728, <http://dx.doi.org/10.5664/jcsm.2276> showing there were alterations in sleep stage transitions and sleep instability in CFS and FM, but not a basic deficit in sleep function. Based on EEG and Polysomnogram tests, there have been some demonstration of changes in sleep architecture in CFS and FM patients with abnormal findings such as:

- Abnormal sleep stage transitions
- Disruption of duration and distribution patterns
- More arousals and lower sleep efficiency (Time in Bed)
- Alpha waves of 8-12 HZ (cycles per seconds) intrusion in 0.1-4 HZ Delta sleep, abnormal pattern during non-rem sleep on EEG. This means when in deep (Delta) stage sleep, the Alpha (REM) stage intrudes into the deep sleep and interrupts the deep sleep stage, which suggests you are not getting the true benefit of deep sleep. This can be associated with daytime sleepiness, pain and depression.

In CFS/ME patients:

- Shorter Total Sleep Time (TST)
- Shorter total Rapid Eye Movement (REM) and more REM to waking (waking up after dreams instead of moving into a deeper sleep)
- Shorter spindles* called S1, S2, more S1 to waking
- Extended sleep latency (prolonged sleep onset)

In FM patients:

- Decreased spindles* in stage 2 sleep. Spindles are a sign of stage 2 sleep and decreased spindle density in stage 2 mechanisms shows impairment. Spindles come from the thalamus through to the cortex. Currently, researchers are looking into the genetics of spindles.
- Individuals with FM who had the best sleep in the laboratory, when exposed to noises, in Dr. Solet's research were those who had the most spindles in stage 2 sleep.

* A spindle is a burst of oscillatory brain activity during stage 2 sleep and consists of 12-14 HZ waves, which occurs for at least 0.5 seconds.

The importance of biomarkers in CFS and FM

Dr. Solet asked, "Why are we looking for biomarkers and what good will they be to us?" If real biomarkers could be identified, it would help improve diagnostic ability as well as the following:

- Help to understand the pathways and mechanisms going forward for patients
- Help to increase funding because it would confirm an organizational treatment direction
- Lead to interventions
- Validate subjective experiences

If biomarkers were identified and available, getting a diagnosis would be easier and reached more quickly; thus, there would be less suffering by the patients. Subjective reports by patients are too easily rejected in the absence of an objective biomarker and many times patients feel invisible.

Role of Heart Rate Variability in CFS

A study recently published in *Autonomic Neuroscience* that looked at Heart Rate Variability (HRV) in CFS is very promising in Dr. Solet's opinion. Solet explained that HRV refers to the variation in the time interval between heartbeats (presentation slide New Direction: Heart Rate Variability). This study found that the parasympathetic component—the “fight or flight” mechanism of the autonomic nervous system—was not functioning properly in CFS patients. Instead, it left patients in a more aroused state than should be the case. The normal changes in heart rate adjustments are not happening and patients end up feeling “wired but tired.” This was a consistent finding and one that Solet views as being very hopeful because there may be ways to modify it, with neuro-feedback or pharmaceutical interventions.

Study citation: Fumiharu Togo and Benjamin H. Natelson, “Heart rate variability during sleep and subsequent sleepiness in patients with chronic fatigue syndrome,” *Autonomic Neuroscience* 176, no. 1-2 (March 14, 2013): 85-90. doi: 10.1016/j.autneu.2013.02.015.

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Options for sleep management

How to create a sleep-conducive environment

Dr. Solet then spoke about what people can do to take control over the night and create a sleep-conducive environment. Start by evaluating your bedroom environment (e.g., sound, light, temperature, humidity, safety, and technology in the bedroom) and limiting your bedroom activities to sleep and sex only. The recommendations shown below are typically geared for the average person. However, Dr. Solet suggests individuals with CFS or FM try to incorporate those that are reasonable for their special circumstances.

Improving Sleep I

-
- Condition yourself to move into a “wind down” routine
- Use white noise from HEPA filters to help mask noise while cleaning air
- Negotiate with other people in the house for quiet during the sleep time that you need
- Use room darkening curtains to prevent bright light from waking you up
- Keep the bedroom at a cool temperature and with adequate humidity
- Clear the pathway around the bed from tripping hazards
- Don't use electronic devices close to bedtime or while in bed because the type of light they emit blocks melatonin which naturally rises at night
 - Use incandescent light or electronic reading devices that are not back-lit and won't disrupt melatonin production if reading helps you relax at bedtime
 - Remove TV from the bedroom or put it on a shut off timer so it does not wake you up
 - Use the bedroom for sleep and sex only

Improving Sleep II

-
- Go along with your chrono-type and respect your natural proclivities—your tendency towards morningness or eveningness
 - Make sure things that you use (e.g., prescriptions, over-the-counter medications, alcohol, substances, supplements, caffeine intake) are not causing side effects or negatively impacting your ability to fall asleep
 - Be mindful about exercise and light exposure—morning light is the most alerting and most beneficial in maintaining circadian entrainment
 - Do your best to maintain a consolidated sleep schedule (i.e., keeping your sleep periods together)
 - Try to get everything under control, like night care responsibilities of elderly parents, partners, children, and pets, before going to bed
 - Negotiate with your partner or other family members to deal with nighttime issues so you don't have to disrupt your sleep

Improving Sleep III

-
- Allow sufficient vertical time after dinner so that you are not going to bed with a full stomach. If you have acid reflux, when in bed, elevate your head with a wedge pillow.
- Create a bedtime ritual, like reading or listening to music, but NOT looking at all your emails or other alerting activities when getting ready for bed.
- Taking a warm to hot bath two hours before going to bed, instead of a morning shower, has been found to benefit people with Fibromyalgia by cooling down their body temperature and promoting better sleep.
- Positioning in bed for restful sleep may include placing pillows to support or prop up painful areas and wearing comfortable clothing.
- Prepare for WASO (wake after sleep onset): have water by your bedside for thirst; keep the path clear to the bathroom and set up a small nightlight in case of nocturia; keep eye drops handy for dry eyes; and be prepared to use self-soothing routines to help yourself get back to sleep.
- If your problems with sleep are getting worse, despite all your efforts, then discuss the situation with your doctor and advocate for further screening; it is not uncommon to have multiple health problems and primary sleep disorders become more common with age.

Additional tips and considerations □

Taking a power nap has many benefits for physical health and memory/concentration. Dr. Solet is a big fan of napping and mentioned advocating for rest areas in hospitals, hoping to create a setting for nurses, who often work 12-hour shifts, to take power naps. These can help to restore mental clarity and promote patient safety.

Short naps of 20-30 minutes, often referred to as “refresher” naps, can make a difference. She encourages these for everyone who can fit these into his/her schedule. A full cycle nap takes 90

minutes and should be taken earlier in the day, so it does not interfere with the nighttime sleep schedule. Since full cycle naps bring people into deeper sleep, Dr. Solet advised the audience to allow enough time to get through sleep inertia by avoiding immediate activities that requiring high levels of attention until they are fully awake.

Another suggestion offered by Dr. Solet was to look at alternative paths, like meditation and yoga, to add restoration to one's life. There is medical evidence that these techniques can contribute to neurogenesis and greater preservation of one's nervous system.

Anticipate, recognize, adapt work-life balance

Dr. Solet concluded this segment with an emphasis on the importance of anticipating and making necessary preparations ahead of time, especially as individuals living with a chronic illness.

She stressed that learning to say a positive “no” can help create balance as part of a work/home/chronic illness strategy. There may be times when you feel like you are driving on empty and if you are still working, it may be wise to seek advice about whether to disclose your disability/health problems and ask for reasonable accommodations under the protections of the Americans with Disabilities Act (e.g., to be permitted to take rest breaks at work which could help with job performance). Social support is critical because it provides guidance and positive interaction with others.

Tools for self-awareness are also very important because they can help someone recognize/become aware of details or changes in her health. For example,

- Using a sleep diary or journal, or even getting an app for the cell phone, can help one keep track of one's sleep schedule to see patterns that might otherwise be missed.
- Flexibility and pacing are techniques that help to maintain a healthy balance. Don't be rigid with yourself. Try to be forgiving.
- Recognize times when you are well enough to tackle difficult challenges and when it may be better to turn to something less demanding, like sorting the laundry.
- Develop a contingency plan for things that you do which are important, in order to have an alternative arrangement for when you don't feel well.
- Remember, the power of “no” is a critical skill that everyone should learn—knowing how to say no can actually being respectful of yourself and the other person.

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Sleep Disorders

Overview of common sleep disorders

Next, Dr. Solet described common complaints that patients give and could be indicative of sleep disorders. Individuals may report they can't fall asleep or can't stay asleep; they are sleeping too much or at the wrong times; they are moving around during sleep or feel that they are not breathing right during sleep.

Untreated sleep disorders may explain and contribute to fatigue and must be carefully excluded. A summary of common sleep disorders may include:

- Insomnias or hypersomnias (i.e., can't sleep or sleeping too much)
- Restless leg syndrome (RLS) and periodic limb movements disorder (PLMD)
- Sleep apnea: two types, one is associated with an obstruction of the respiratory system and the other, central apnea, is a neurological problem
- Parasomnia: sleep-walking, talking, bruxism
- REM sleep behavior disorder (i.e, acting out what the individual is dreaming)
- Psychiatric: depression/dysthymia, anxiety, post-traumatic stress disorder (PTSD)
- As mentioned earlier, the sleep environment including partners, pets, environmental disruptions should also be evaluated

Sleep screening considerations

- **Life cycle stage**—Different problems that people have with sleep, in part, relate to their life cycle and developmental stage: adolescence, pregnancy, menopause, and aging.
- **Health Status**—Check for other health problems that could impact sleep, like fatigue, pain, allergies, depression, anxiety, PTSD, diabetes, weight, and medications.
- **Special Stressors**— Find out if the patient is going through a difficult situation (e.g., grief, job loss, relocation, divorce, or an existential crisis) that could affect sleep.

- **Personal and family sleep history issues**—Assess a patient’s heritage or family history, which may provide evidence of a predisposition for certain problems.
- **Sleep hygiene and habits**—Ask patients about their exercise, eating, activities in bed, erratic schedule, caffeine and/or alcohol consumption.
- **Sleep environment**—Review sleep setting/disturbances (e.g., partners, noise, light).
- **History of accidents**—Inquire about patient being drowsy while driving or having excessive daytime sleepiness, which may suggest sleep apnea or other sleep disorders.
- **Sleep apnea**—Evaluate for sleep apnea. There are two types: obstructive, which is associated with an obstruction of the respiratory system and central apnea, which is a neurological problem. Snoring, choking, and gasping during sleep are signposts of obstructive sleep apnea. Often, a sleep partner will report these problems while the patient might be unaware of their numerous arousals of interrupted breathing. Treatments may include the use of a CPAP machine, dental prosthesis, surgery to correct structural problems, and weight loss.
- **Restless Legs Syndrome (RLS)**—Tingly, abnormal sensations in the legs is indicative of RLS. It is found to be more prevalent in individuals of northern European heritage and to have an association with low iron reserves.
- **Periodic Limb Movements Disorder (PMLD)**—PMLD presents with movement of limbs during sleep.

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Questions and Answers

Q: Do you know what the apnea-hypopnea index number needs to be before Medicare /Medicaid will consider it treatable?

A: I don’t know what number triggers insurance coverage. However, it depends on a number of things: who you see, your age, your symptoms, and additional problems you might have that could be exacerbated by the apnea. Young people who have a low index, 5-15, may not get treated, but as you get older, especially if you have low oxygenation, chances for treatment increase. Someone in the audience has that information for Medicare/Medicaid and it is 5 wake-ups per hour.

Q: Can you catch up on sleep on weekends?

A: It is better than not catching up but it is best to have a consistent schedule and that will make

Monday mornings easier if you have to get up for work. It is best to have as little sleep debt as possible. If you let your sleep debt go for too long, it is possible you won't be able to pay it off and it will cause physiological changes that may be difficult to reverse.

Q: How do you approach daytime hypersomnia?

A: It would be important to find out the cause of the daytime hypersomnia and rule out disorders like narcolepsy. Anyone who is really conking out during the day and sleeping at night needs a full sleep screening. It is also important that people do not assume that ongoing daytime sleepiness and conking out in a sitting position is typically part of CFS or FM. These could be signs of a separate sleep disorder or other medical problem.

Q: Why did you not mention use of medications for sleep problems?

A: I am not an MD and I don't give out prescriptions. I think there are more hype and advertisements for sleeping medicines than is necessarily good for us. The data on the number of Americans who are self-medicating themselves to sleep and then again to stay wake and alert is alarming versus sleeping in a normal way. In CFS, if we can begin to unravel an indication of what is going wrong, we may be able to come up with a medication that enhances sleep, perhaps by increasing spindles in stage 2 sleep. It would need to be tested and proven. There are many risky, undesirable side effects of sleep medications such that they can induce a hypnotic like state of memory-loss during which a person can do activities such as eating, driving or walking around and not remember it. Individuals who cut their sleep short but use sleep medication, there is the potential that when they arise to go to work, they are not fully alert, but they are getting in their car and driving. Many of these medications are not benign, especially if you already have medical problems. The decision to use them should be made in a careful consultation with your doctor or even better, with a medical sleep specialist.

Q: Do most insurance plans allow for sleep studies?

A: This situation is evolving right now and some people think perhaps not in the best direction. In recent years, when there is reasonable justification for it based on symptoms and history, there has been support for in-lab testing. Testing would include a full polysomnogram and results would be read to look carefully at your sleep architecture and oxygenation during the

night. These tests are very expensive and insurance companies have begun backing away from them and are asking people to do home studies. The home study equipment technology is advancing. One argument for home studies is if you're testing someone in their own bed you're testing the way they really sleep with whatever external interruptions: i.e. light, pets, sleep partner. If a home study is difficult to read or suggests more serious problems, you can ask your doctor to advocate for you to get a sleep study done in the lab.

Q: What would you recommend for someone who is wide-awake at 3 am?

A: A newspaper route. There is a belief in the U.S. that people are supposed to sleep uninterrupted for 8 hours. But in a natural setting, indigenous people have had what was known as a first sleep and a second sleep. They would wake up and share dreams, pour over their meaning, and then go back to sleep. So, if you wake up at 3 in the morning, it doesn't mean something is wrong with you. The real question is if you wake up and haven't had sufficient sleep, what kind of things can you do to put yourself back to sleep? There are calming methods such as breathing exercises, soothing music, etc. If you keep a sleep diary, it may help you see a pattern or figure out what works or doesn't work to help you fall asleep. Dr. Solet's concluding remarks, "I encourage you to be scientists."

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About Dr. Solet

Jo M. Solet, MS EdM, PhD, OTR/L is a Clinical Instructor in Medicine at Harvard Medical School, a member of the Harvard Medical School Division of Sleep Medicine and the Department of Medicine at Cambridge Health Alliance. She holds basic science, clinical, education, and research degrees; her HMS post-doctoral training was in behavioral medicine. Dr. Solet is uniquely qualified to coordinate and contribute to interdisciplinary efforts. Bringing together evidence-based medicine with evidence-based design, she served as Principal Investigator for a multiple grant study of noise and patient sleep disruption in hospitals with the results published in the *Annals of Internal Medicine*. She is a voting member of the Health Care Guidelines Revision Committee (HGRC) that develops construction guidelines for healthcare facilities that become law in the majority of the United States. She has also served as the elected Faculty Chair of the Harvard Medical School/Harvard School of Dental Medicine, Joint Committee on the Status of Women (JCSW), and on The Harvard University Task Force on Women in Science and Engineering. Dr. Solet is a science advisor to Lark Technologies, an MIT/Stanford start-up health technology company and has a small private practice near Harvard Square. More information about Dr. Solet's

research interests and publications is provided at the end of the summary.

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For more information

Learn more about Dr. Solet's research interests and publications at the Division of Sleep Medicine, Harvard Medical School website:

<https://sleep.med.harvard.edu/people/faculty/899/Jo+M+Solet+MS+EdM+PhD+OTR+L>

Dr. Solet recommends Sleep and Health Education, a resource provided by the Division of Sleep Medicine, Harvard Medical School: <http://healthysleep.med.harvard.edu/portal>

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