

# MAMMOUTH MAGAZINE

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The Centre for Studies on Human Stress is dedicated to improving the physical and mental health of individuals by empowering them with scientifically grounded information about the effects of stress on the brain and body.

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## Stress and sleep: Avoid it from becoming a nightmare!

### Editorial

Marie-France Marin, Ph. D. & Sonia Lupien, Ph. D.

**W**hen experiencing stressful life events, it is common to feel the effects of stress on the quality and quantity of our sleep. A bad night's sleep can make us more inclined to interpret a situation as stressful and, therefore, induce a stress response. Clearly, stress and sleep mutually influence one another. Beyond the fact that they are interconnected, stress and sleep have a considerable impact on the development and maintenance of various physical and mental pathologies. Our seasoned Mammoth Magazine readers know that we encourage people to tackle their daily stress. We see this as an important part of a healthy lifestyle, just like nutrition or physical exercise. You will see in this issue that sleep should not be an exception to the rule.

We are very proud to present the 19th issue of the Mammoth Magazine on stress and sleep. We have put together an ensemble of informative texts to provide you with tools to understand this domain. We begin with an interesting interview with Dr. Julie Carrier, an expert in the field of sleep research. As you will soon discover, Dr. Carrier has many ongoing projects that focus on sleep, but her mission is also to sensitize the general public about the importance of sleep. Alexe Bilodeau-Houle, a Master's student in psychology at University of Montreal authors the second article of this issue addressing dysregulations of the internal biological clock that often occur among travelers or night-shift workers. Audrey-Ann Journault, also a Master's student in psychology at the University of Montreal pens an article on seasonal affective disorder, an elusive disorder that tends to show



itself when November comes around. Then, Dr. Sonia Lupien, Founder and Director of the Center for Studies on Human Stress explains the fascinating link between sleep and obesity. This article might surprise you! Philippe Kerr, Master's student in biomedical sciences at the University of Montreal, writes on sleep disruptions in different

psychiatric disorders such as depression, burnout, anxiety disorders and post-traumatic stress disorder. By the end of this Mammoth Magazine issue, you will undoubtedly be convinced of the importance of sleep. As such, we conclude this issue with a list of resources that you can consult if you experience difficulties sleeping. Catherine Raymond, Doctoral

student in neuroscience at the University of Montreal and Sarah Leclaire, Master's student in neuroscience at the University of Montreal have done a remarkable job in crafting a toolbox that provides you with plenty of resources.

We are convinced that these articles will keep you awake. Happy reading!

## Sleep:

From the brain to a national campaign!



## Profile of a researcher: Julie Carrier, Ph. D.

*Marie-France Marin, Ph. D.*

When Dr. Julie Carrier was only a Bachelor's student in psychology at the University of Ottawa, she firmly aspired to become a clinician. She applied for a grant to continue her graduate studies. She obtained a selection interview but was told that she would have to focus only on research in order to obtain the grant. Encouraged by her mentors and friends, she showed up for the interview without any expectations. She received the grant. Dr. Julie Carrier began her graduate studies under the supervision of Dr. Marie Dumont, an expert in the field of sleep. Dr. Carrier went on to complete a postdoctoral training

on sleep and aging at the University of Pittsburgh before returning to Montreal to launch her career as a researcher. She has never regretted taking this decision. As you may have noticed, Dr. Julie Carrier has a brilliant career and works on a very interesting topic that too many people neglect in their daily lives - sleep.

Julie Carrier is a professor at the Department of Psychology, University of Montreal, and a researcher at the Center for Advanced Studies on Sleep Medicine at the Sacré-Cœur Hospital Research Center. She was recently appointed vice-rector of research at the University of

Montreal. In addition to her many academic responsibilities, she is also the director of the Canadian Network of Sleep and Circadian Rhythms. One wonders when she finds the time to sleep! Well, think again! Having studied sleep since her bachelor's degree, Dr. Carrier does not need to be convinced of the importance of sleep in order to maintain optimal physical, cognitive and emotional health.

Dr. Carrier dedicated a large portion of her career to studying sleep in the elderly in order to understand its impact on cognitive abilities. This may seem a bit paradoxical at first, but sleep can influence many of our cognitive abilities when we are awake, namely our memory, attention span or even the speed at which we process information. In one of

her studies, Dr. Carrier compared sleep patterns of elderly individuals presenting a mild cognitive impairment to that of elderly individuals without any cognitive impairment. The results showed that both groups had different sleep patterns. Both groups were more distinct from one another during sleep than during awakening. Given that a percentage of individuals with a mild cognitive impairment will develop Alzheimer's disease, Dr. Carrier would like to continue her research to determine whether differences in sleep patterns could lead to better prediction of Alzheimer's disease.

**It seems that sleep is a window of cerebral functioning that can be used to predict certain pathologies.**

Should we be concerned about our sleep only as we age, given that it is during this period that more diseases appear? Studies have shown that sleep in children could predict their cognitive abilities ten years later.

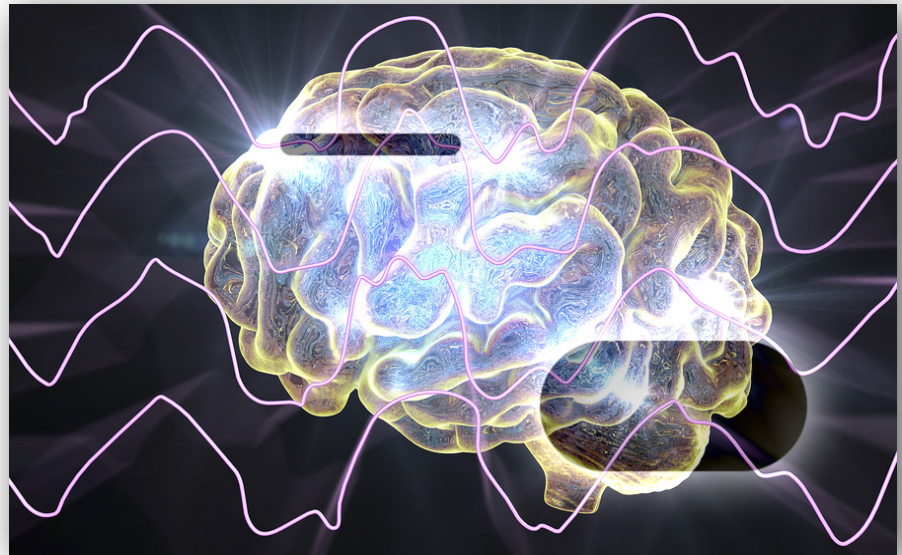
**According to Dr. Carrier, increasingly more studies suggest that sleep is essential for healthy living and that it is important to include it in our daily routine, as is the case with nutrition, exercise and stress management.**

Studies suggest that starting from adolescence, until the age of 40-45, people tend to minimize the impact that sleep loss can have on the body. We tell ourselves that we can cut back on sleep to obtain a better social life or to be more productive at work. Although the body has the ability to adapt, the fact remains that in the long run, the effects of chronic sleep loss could have a significant impact on many areas of daily living.

This seasoned researcher is far from being short of ideas for new research projects. Currently, Dr. Carrier is working on a project that aims to document the impacts of luminosity on the wake-sleep cycle in individuals with dementia who reside in long-term care centers. In fact, wake-sleep cycles are often abolished in people suffering from dementia. Her

study, therefore, aims to examine if a change in the light-dark cycle could have an impact on the quality and quantity of sleep in these individuals. In a different vein, Dr. Carrier is working on a new research project that aims to test the im-

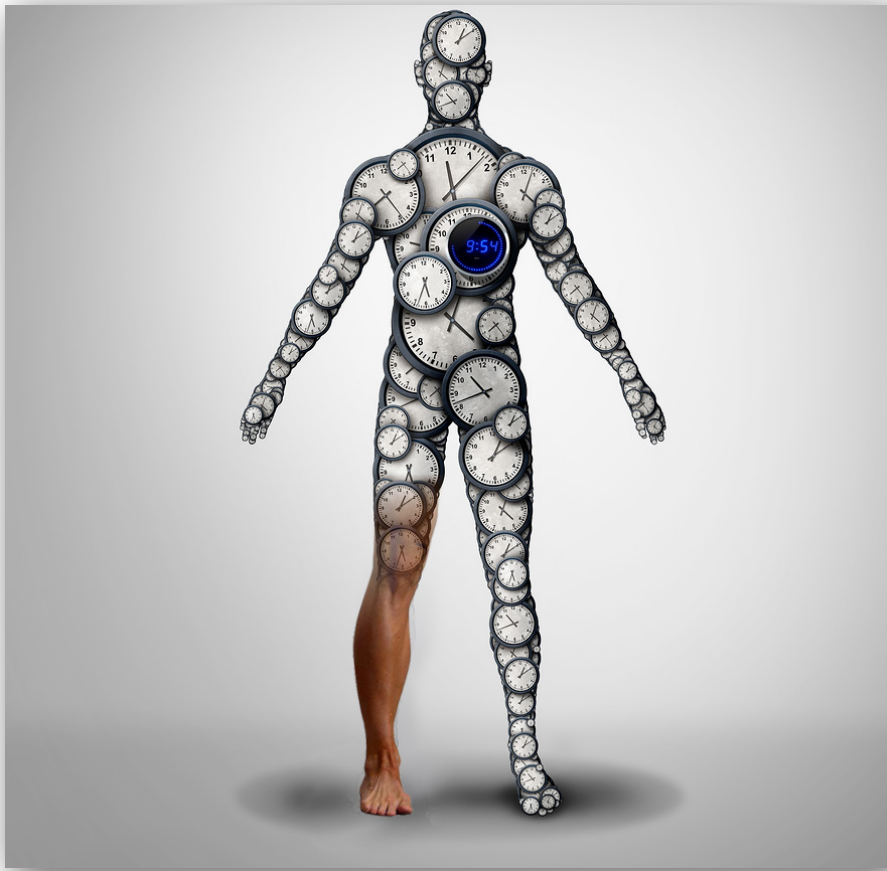
organized, this campaign will be active on the web and on social media. So stay tuned and do not miss this great initiative.



impact of cannabis on sleep in a laboratory setting. To date, studies have mainly examined people who consume large quantities of cannabis for long periods of time. It is, therefore, difficult to know the impacts of recreational use on the brain and on sleep. Dr. Carrier and her team are working to put in place a study that will test the impact of consuming small doses of cannabis on sleep. With the recent legalisation of cannabis, it is clear that the results will be of great importance and interest to the general public as well as political decision-makers.

Given the scope of her research topic and the evidence that demonstrates the importance of sleep on healthy living, Dr. Carrier increasingly feels the need to transfer knowledge from her lab to the public in order to better equip individuals on how to deal with this topic. As such, she has accepted the role of scientific director of the Canadian Network on Sleep. In Vancouver, September 2019, a national campaign on sleep will be launched. Her objective is to raise awareness among Canadians on the importance of sleep on mental and physical health, and to provide them with the tools to ensure healthy sleeping habits. Along with numerous activities that will be





## When the body's internal biological clock is not "in sync"!

Alexe Bilodeau-Houle, Master's student in Psychology, University of Montreal

If you have traveled through different time-zones, for instance, from Canada to France, you may have felt very tired in the days following your arrival. Did you wake up several times during the night, even if you were exhausted when you went to bed? You guessed it! These are common symptoms associated with 'jet lag'. Why do symptoms of jet lag persist for several days?

### Circadian rhythms

Before going any further, we need to understand the notion of a circadian rhythm. A circadian rhythm is an endogenous biological rhythm (inside our body) that extends over a period of approximately 24 hours. Among mammals, circadian rhythms play a key

role in regulating most of our bodies' physiological mechanisms. The wake/sleep cycle, which causes us to be active during day and asleep at night, is a good example of an endogenous circadian rhythm. Does this mean that our wake/sleep cycles are not regulated by the day/night cycles of the earth? Not exactly, but we will come back to this later!

For now, let's go back to the year 1729 when Jean-Jacques d'Ortous de Mairan discovered circadian rhythms. By placing plants in a dark environment, he noticed that without environmental cues (e.g., daylight), flowers from these plants moved as a function of day/night cycles of the earth. This indicated that even in the absence of cues from the

environment, plants maintained a 24h endogenous rhythm. This phenomenon has also been demonstrated in humans. Individuals isolated from environmental cues, spending several weeks in caves without any daylight maintained a wake/sleep cycle of approximately 24 hours. How does our body manage to maintain these endogenous rhythms without even requiring light and/or environmental cues? Behold, the suprachiasmatic nucleus. The suprachiasmatic nucleus is located in the hypothalamus, an important part of the brain that plays a key role in many fundamental regulation processes of the organism (e.g., body temperature, hunger and thirst). This part of the brain also acts as the human body's biological clock. Brain cells found within this area generate a 24-hour rhythm as a result of a very complex genetic process. This rhythm is then communicated to the pineal gland, a small gland located in the brain that secretes melatonin, a hormone that plays a central role in the regulation of sleep/wake cycles. More specifically, melatonin is a hormone that promotes sleep. Quantities of melatonin secreted during the day are relatively low and increase during the evening and night. Now, if the body generates its own circadian rhythm, how does it also follow day/night cycles of the earth? Our bodies achieve this by synchronizing with our environment. Although many environmental cues act as synchronizers, the most important one is daylight. Our eyes are equipped with receptors that capture light and communicate information to the suprachiasmatic nucleus. Thanks to these signals, the suprachiasmatic nucleus can synchronize our endogenous biological rhythms with our environment's day/night cycles.

### Jet lag and internal desynchronization

When travelling across multiple time zones, your internal biological clock loses synchronicity with your new environment. It may still be synchronized with your previous country's day/night cycle. This incongruity between the internal biological clock and the environment is responsible for secondary effects of jet lag. For example, you may experience symptoms such as sleep

disturbances, difficulty concentrating, fatigue during the day and even digestive problems. If you are on vacation, this is not so problematic. However, if you are on a business trip, this can impede on your productivity. Similarly, jet lag can be detrimental to professional athletes, especially when it comes to athletic performance. Interestingly, the severity of these symptoms depends on the direction in which we travel! It is easier for our bodies to travel from eastern to western locations, rather than from western to eastern locations. This is because when we travel from east to west, we need to delay our circadian rhythm in order to synchronize to our

For instance, researchers studied the impact of chronic jet lag on the brain's temporal lobe volume, a region that is associated, with memory, amongst other things. In a study, women working in aviation were divided in two groups according to frequency to which they were exposed to chronic jet lag conditions. Women who were more frequently exposed to jet lag conditions showed a significantly lower temporal lobe volume when compared to women who were occasionally exposed. It is important to consider that this study only looked at a few individuals and more scientific data is required to draw clear conclusions on these results.



new environment. Conversely, when we travel from west to east, we must advance our circadian rhythm, which is more difficult for us. This why we find it far more difficult to travel from Montreal to Paris rather than the opposite. Occasional exposure to jet lag is not detrimental to health as our internal biological clocks can synchronize to the new environment and symptoms usually dissipate within a few days (the bodies require approximately 1.5 days per hour of jet lag to resynchronize).

**However, chronic exposure to jet lag conditions (e.g., aviation pilots) can have dire consequences and persist over time.**

### **Living at night**

Jet lag is not the only factor that can provoke a desynchronization between our internal biological clocks and the day/night cycle of the environment. Night-shift work is another perfect example of how this may occur. Night-shift work has been associated with negative biological, physiological and psychological outcomes. In the context of sleep,

**many disturbances occur in night workers such as difficulty falling asleep, (frequent sleep disruptions and awakenings) along with a reduction in sleep hours.**

The average number of sleep hours among these workers is approximately 2 to 4 hours less than day-shift workers. Night-shift workers may experience extreme fatigue and become less vigilant, which can impede their work performance and productivity and even lead to more work-related accidents. Moreover, night-shift workers have an increased risk for developing conditions such as diabetes, cardiovascular diseases, gastric/intestinal diseases and obesity. They are also at greater risk of developing symptoms of anxiety and depression.

It is important to note that there are individual differences in the way people adapt to night-shift work, where some people adapt better than others. For example, it would seem that a person who has a night-chronotype (an individual who naturally prefers to go to bed late) would be associated to a better adaptation to night-shift work. However, when it is not the case, what can we do to reduce symptoms associated with night-shift work? One of many non-pharmacological therapeutic possibilities is light therapy (or phototherapy). For this, individuals are exposed to an intense light source that bears similar properties with sunlight (called light therapy lamp). However, exposition to light therapy lamp needs to occur at the right moment in order to be effective. For night-shift workers, light therapy must occur just before their shift in order to delay the secretion of melatonin and, in turn, delay the circadian rhythm. On the other hand, after their shift, night workers should avoid being exposed to light. For this, they can benefit from wearing a pair of glasses that decrease the impact of light. We now know that the body has an internal biological clock that synchronizes with the environment. It is when desynchronization between the internal biological clock and the environment occurs that we experience symptoms of jet lag. Although these symptoms are normally short-lived, chronic jet lag and night-shift work can lead to more harmful and longer-lasting symptoms. If this concerns you, know that there are solutions!



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## Seasonal depression: a mix of sleep, light and hormones

*Audrey-Ann Journault, Master's student, Center for Studies on Human Stress*



**I**t's the end of October on a Tuesday morning, and the month of November is just around the corner. Workdays seem to get longer and the hours of sunshine seem to shorten. Waking up in the morning becomes more difficult by the day. Energy and willpower are decreasing.

Can you relate to this? The following article will explain why and how seasonal changes affect your energy and mood. By the end of this article, you will also be able to decide if moving to a country in the South is a solution to consider. We will also look at

other solutions (simpler and less expensive) suggested by recent studies.

### What is seasonal depression?

**It is estimated that 2 to 6% of Canadians will suffer from SAD in their lifetime.**

However, one study shows that people whose severity of seasonal depression symptoms do not reach clinical significance, experience the same biological responses as those that do. And so, it is not only in our heads!

**Explanation: we live according to cycles that are sensitive to light**

### Biological rhythms

Our life is organised according to different cycles called biological rhythms. The most known are circadian rhythms. Circadian rhythms ('circa' meaning around and 'diem' meaning day) occur over a period of 24 hours (ex: body temperature). However, certain rhythms last longer than 24 hours: these are infradian rhythms. The coming and going of seasons is a prime example since it occurs over the course of one year. Our body synchronises to these rhythms like an internal clock that accounts for the passing of time. It is the suprachiasmatic nuclei of our brain

(mixture of nerves) that are responsible for this synchronisation. Furthermore, to optimise this synchronisation, the brain uses clues from the environment. In the case of seasonal depression, the main environment clue is the photoperiod, that is, the duration of light during the day.

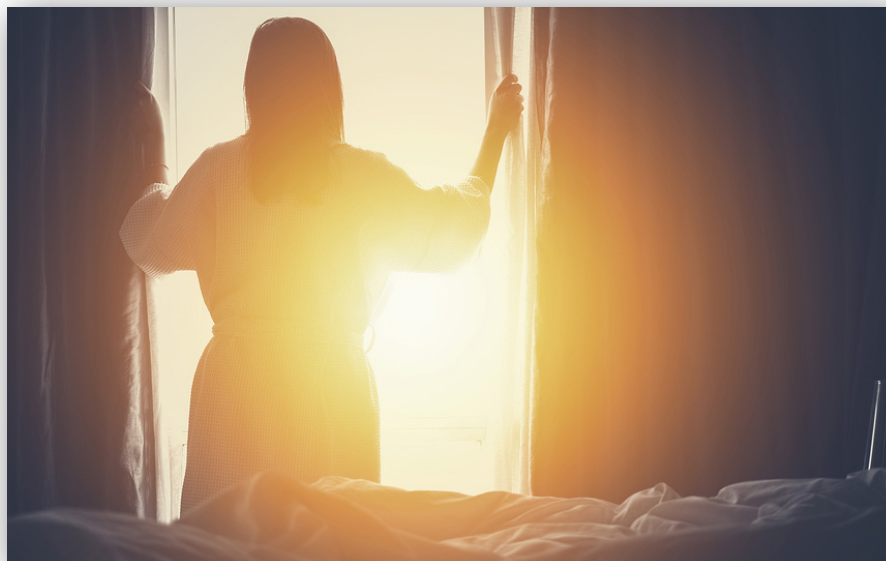
### Biological rhythms and cortisol

Our circadian rhythms are influenced by photoperiod. During winter in Quebec, natural photoperiod decreases dramatically. Researchers studied if winter has an impact on cortisol secretion (main stress hormone) that plays a role in depression. Results of the studies are contradictory but still suggest that individuals who self-diagnose with SAD have cortisol levels similar to “healthy” people, whether it be in winter or in summer. More recent studies have examined whether winter has an impact on the cortisol response at awakening. It corresponds to an endogenous increase in cortisol 30 to 60 minutes following awakening. Surprisingly, the cortisol awakening response was less pronounced in winter, in people who auto-diagnosed themselves with SAD compared to healthy adults. However, in the summer, both groups had similar cortisol awakening responses.

### Biological rhythms, sleep and melatonin

How can these results be explained? First, as mentioned in the above article, the wake-sleep cycle is influenced by sunlight. In fact, melatonin secreted by our internal clock to decrease our waking state (you fall asleep) is like a vampire; it does not like the sun. When the sun’s rays peek through your blinds each morning, your internal clock stops secreting melatonin and this is what wakes you up. You are now awake but it is not enough to start the day off right. You lack energy, which is acquired by the cortisol awakening response. In healthy adults, a greater amount of cortisol is secreted in the morning and this quantity decreases gradually throughout the day to reach its lowest levels before bedtime. For years, we’ve been telling you that stress is good and necessary for your survival... well, here is another argument to convince you! Without the increase in morning cortisol, you would not be ready to face or even accomplish anything during the day.

People who suffer from SAD have a less pronounced peak of cortisol in the morning. This seems to be consistent with the aforementioned symptoms (lack of energy, difficulty getting up). In winter, the further north we are, the later the sun comes up. Some people’s internal clock would have a hard time adjusting to this lack of light upon awakening. Their wake-sleep cycle is disrupted and, therefore, their “boost” of morning energy regulated by cortisol is not optimal!



artificial light of sufficient power decreases depressive symptoms during winter. The ideal treatment would be to expose oneself to a luminotherapy lamp with a power of 10,000 watts for 30 minutes every morning. Exposure to a power of 2500 watts for a total of two hours per day (for example, twice for 1 hour or four times for 30 minutes) could also be effective. By way of comparison, lights found in homes vary between 60 to 750 watts depending on the type of lighting in the room. Therefore, we cannot counter the effects of seasonal

### Can we avoid this seasonal depression (other than by moving down South)?

Some studies suggest that symptoms of season depression can be alleviated. It is even quite easy. One simply has to expose themselves to more light in the morning to compensate for the late sunrise. However, all working Quebecers know that this can be difficult in winter since we often leave home before the sun rises and return home after it sets. Taking a walk during your lunch break remains an option. If this is not possible for you, there is another solution: luminotherapy. Many studies have shown that exposing oneself to an

depression by simply keeping the light on in the living room!

**A sunny winter day offers lighting of approximately 100,000 watts, which remains the best option to counter the negative effects of a short photoperiod.**

In conclusion, to combat the symptoms of seasonal depression, moving down South would do the trick, but there is nothing simpler than a day of sunbathing!

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## Can poor sleep make us obese?

*Sonia J. Lupien, Ph. D.*

**I**n 1962, a geologist named Michel Siffre decided to settle in an underground cave, to find out if he could survive in a hostile environment and if this would affect his body and his physiology. At the age of 23, from July 18th to September 14th 1962, he lived in an underground cave that he found in a glacier, which was 130 meters deep with temperatures consistently under zero degrees celsius. After 58 days, he emerged from the cave, and it became apparent that during his stay, he was been unable to evaluate how much time had elapsed. His personal assessment of the time spent in the cave was 25 days short of the 58 days he had actually spent there. For example, he estimated that a period that actually lasted 14 hours was only 4 hours long!

In contrast, assessments made by his colleagues who remained outside the cave, who communicated with him over the phone, multiple times per day, allowed them to determine that during the two months Mr. Siffre had lived in this cave, he had kept a stable wake/sleep cycle of 24 hours and 30 minutes. Just like those who remained on the surface, Mr. Siffre's days were composed of an activity period that lasted an average of 16 hours and he would sleep for an average of 8 hours. Even though his meal sched-

ule became delayed over time, he had maintained a normal circadian rhythm.

Thanks to these first studies and many that have been conducted ever since, we now know that circadian rhythms are present in animals, plants and humans. A circadian rhythm is a biological rhythm that lasts 24 hours on average. The term 'circadian' comes from 'circa' which means 'around' and 'diem' which means 'day'. Therefore, a circadian rhythm is a rhythm that lasts approximately one day.

Four years after conducting his first experiment, Mr. Siffre tried this experience again. However, this time, he brought sophisticated equipment with him which would allow him to record biological measures to determine if various biological markers also followed a circadian rhythm. With this study, and many more that have since been published, researchers have shown that humans conserve a 24-hour circadian rhythm for the majority of biological markers, such as body temperature, heart rate, hormonal fluctuations, nutrition, vigilance and muscular strength.

### **The internal clock**

In 1972, researchers showed that maintaining a 24-hour circadian rhythm,

regardless of the environmental condition, is achieved by a structure located in the middle of the brain called the suprachiasmatic nucleus. This structure acts somewhat as an internal biological clock and modulates secretion of hormones and other substances in our bodies, while also being responsible for how our brain cells (or neurons) react to different types of stimulations. We know that if we remove this small brain structure in rats, as part of a scientific experience, the animal will no longer have biological rhythms. In contrast, if we transplant a rat's suprachiasmatic nucleus to another rat, the receiver will exhibit its donator's biological rhythms!

This biological clock allows us to synchronize with our environment. The suprachiasmatic nucleus synchronizes its activity to light exposure within the environment, which allows us to synchronize our biological rhythms.

### **Sleep**

One of the functions associated with biological rhythms is sleep. On average, we sleep 8 hours and are active 16 hours each day. However, over the last 100 years, with the development of artificial light, our societies have been operating 24 hours a day. Moreover, with the advent of social media, we know that it is sometimes difficult to maintain an 8-hour sleep period. For example, Netflix continuously offers TV series that can deprive us of valuable sleep time! Given that circadian rhythms bear the main function of synchronizing our



biology (e.g., body temperature, hormone levels, vigilance, concentration) with the environment, many researchers have been paying close attention to the biological effects of sleep deprivation

### **Fewer hours of sleep and poorer quality of sleep**

Researchers tried to determine the optimal amount of sleep required for one to be in good health. In 2015, various organizations around the world met to establish consensus on this matter.

**After numerous discussions, these organizations concluded that the ideal quantity of sleep is 7 hours per night. Therefore, if one sleeps less than 7 hours a night, for most nights, one is considered someone who does not sleep enough. But sleeping too much is not better!**

New studies have shown that sleeping more than 8 to 10 hours could be detrimental to one's health! This suggests that there is in fact an optimal number of hours of sleep that has the most beneficial effects on one's health.

### **Consequences of sleep deprivation**

In the last 50 years, researchers have attempted to study the effects of insufficient sleep. We have all heard about the impact of sleep deprivation on concentration, mood, etc. However, in 2008, Eve Van Cauter, a world-renowned sleep researcher underlined the intriguing fact that the worldwide obesity epidemic began approximately at the same time that people experienced decreases in their quantity and quality of sleep. This led researchers to study the association between sleep deprivation and the tendency to develop obesity. Two possibilities have been examined to explain the relation between sleep deprivation and obesity.

First, it is possible that sleep deprivation modifies the activity of biological markers which are associated with circadian rhythms, such as hormonal, inflammatory or metabolic markers.

**Some data support this claim and have shown that sleep deprivation is associated with hypertension, elevated levels of cholesterol, inflammatory markers and increased risk of developing diabetes.**

Other studies have also shown that shift workers have an increased incidence of diabetes and are at an increased risk of developing cardiovascular disorders when

for each 5-night period of sleep restriction, participants gained 1 kilogram! Finally, other studies have demonstrated that

**when people are sleep deprived, not only do they consume more food the following night, but they also have a strong preference for foods with high carbohydrate contents (like potato chips or chocolate).**



compared to people who work regular day shifts. Lastly, a longitudinal study (a study spanning many years) conducted in a group of nurses who worked night shifts showed that working at night could lead to weight gain and obesity.

Other researchers have suggested that sleep deprivation is associated with obesity. It decreases vigilance, increases our food intake and could lead to making poor dietary choices. A study published in 2011 showed that adults whose sleep was restricted to 5 hours per night consumed an additional 501 calories per day following each day of sleep deprivation. Another study attempted to replicate this result and showed that extra food is generally consumed the evening following a night of insufficient sleep.

In yet another study where sleep was restricted to 4 hours per night for 5 nights, researchers showed that increases in calorie intake began the night following the sleep restricted night and persisted until the end of the sleep restriction. With this significant increase in calorie intake, researchers calculated that

### **Sleeping well**

From these studies, and many others that have since been conducted, researchers have shown that sleep deprivation can be associated with the development of obesity. Sleep deprivation alters biological rhythms for various biological markers that are associated with our rhythms. Moreover, sleep deprivation affects our cognitive ability and hence our ability to make healthy decisions about our eating habits.

The results from these studies have very important ramifications for people who often work in conditions where circadian rhythms are affected (e.g., aviation pilots, doctors, soldiers, etc.). Until new studies allow us to better understand how to prevent effects of sleep deprivation on body weight, researchers have drawn up a series of recommendations to maximize sleep in humans. These recommendations include:

- Maintain a regular sleep schedule and an evening routine, even on weekends. My colleague, Roger Godbout, who works in the field of sleep, has often told me that on weekends, one should not go to bed more than 2 hours beyond our normal bedtime.

- Seek light during the day (specifically in the morning) and avoid light at night.

- Keep the bedroom cool (not too warm), dark and comfortable

- Avoid caffeinated beverages, nicotine, alcohol and medication with stimulant effects during the evening

- Avoid taking naps (especially if you have trouble falling asleep at night)

- Avoid obsessively checking your clock to see if you are falling asleep. This will only contribute to feeling more stressed, and keep you from falling asleep!

And, if ever you experience a period where it is more difficult for you sleep well... make sure to stay away from the potato chips aisle when doing your groceries!

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## **Sleep and pathologies related to stress**

*Philippe Kerr, Master's student in biomedical sciences, Center for Studies on Sex/Gender, Allostatic Load and Resilience, University of Montreal*



**Y**ou have just bought a house thanks to your new job. A couple of months later, rumours are circulating around the company that bosses want to lay off personnel. Your department is affected. Your job is on the line. It is possible that this kind of situation generates stress and affects your sleep. In the case where these sleep disruptions caused by stress are brief and do not affect your daily functioning, they are perfectly normal. However, if they are recurrent and disproportioned, they become problematic. It then becomes important to seek help.

There are a few important factors to consider when one thinks they suffer from a sleeping disorder. Some are individual factors like age (elderly suffer more frequently from sleep disruptions than young adults), socioeconomic ►

status (people from a lower social economic status report more sleep disruptions), chronotype (early bird versus night owl), lifestyle (intense work, alcohol consumption and unhealthy foods or even the presence of a mental disorder). Other factors are specific to sleep itself, such as sleep architecture (the length of each phase of sleep over the course of a night), the time before falling asleep (what is referred to as latency), the quantity of sleep, the quality of sleep and the time during which events leading to sleep difficulties occur. The last decades of research on sleep in humans have shown that sleep plays a central role in mental health.

**With time, many studies have shown that sleep deprivation has a negative effect on many cognitive abilities (emotion regulation, memory, problem resolution, etc.). It is thus not surprising that sleep disruptions are also a key symptom of many psychiatric disorders.**

In people suffering from stress related pathologies such as depression, anxiety disorders, burnout and post-traumatic stress disorder, what changes the quality of sleep? These disorders are very different but all have one thing in common: sleep disruptions.

### Depression

According to the Diagnostic and Statistics Manual of Mental Disorders (DSM-V), one of the diagnostic symptoms associated with depression is insomnia (difficulty in falling asleep or sleeping long enough) or hypersomnia (abnormally long sleep or sleep happening too frequently). In fact, a study showed that from all psychiatric entities related to insomnia, depression is the most frequent one. Researchers showed that between 50 to 90% of people suffering from depression complain about the quality of their sleep. Furthermore, recent studies suggest that depression is associated with more frequent sleep disruptions and a decrease in sleep depth. However, while some researchers demonstrate a change in sleep architecture in people suffering from de-

pressive disorders, these results remain controversial in the scientific literature and more studies have to be conducted in order to reach conclusive results. Finally, sleep disruptions could be a good indicator for an imminent depressive episode or for a relapse in people suffering from depressive disorders.

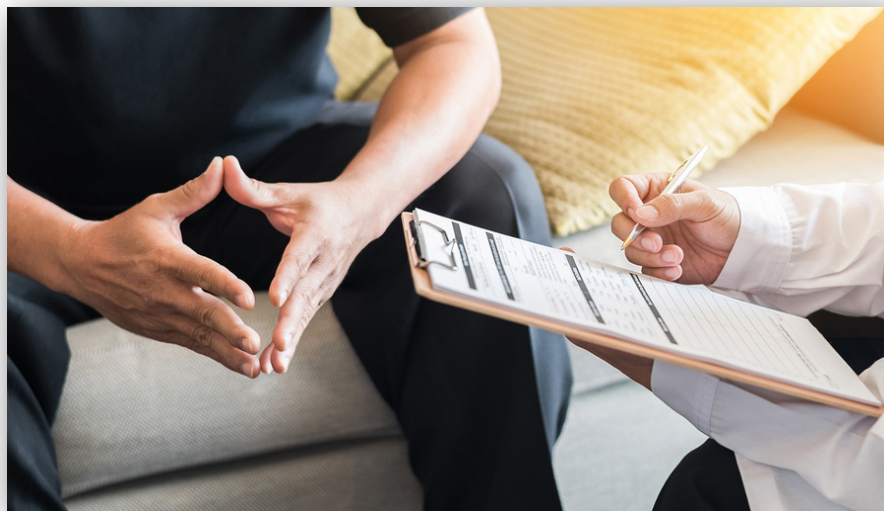
### Anxiety disorders

A study conducted in Montreal was interested in the proportion of people who are not satisfied with their sleep. This study showed that 20% of people were unsatisfied with their sleep and that 7% of these people took medication such as anxiolytics or hypnotic/sedative medication to help counter their sleeping problems. These medications are generally prescribed to treat anxiety disorders (see Mammoth Magazine number 17). In fact, the presence of anxiety disorders is an important risk factor for sleeping problems. Unfortunately, few studies have been published on this subject and the majority of them were conducted on teenagers and children. One study showed that 88% of children and adolescents suffering from anxiety disorders report difficulties related to sleep. Amongst others, sleeping problems related to anxiety that were most often seen in children were due to the anticipation of events (e.g., social events, oral presentation at school, etc.), nightmares, anxiety caused by parents separating, fear of the dark or imaginary monsters. When it comes to nightmares, experts recommend to openly discuss them with

the child and to make them seem less dramatic. By doing so, children understand that they have nothing to fear, while on the other hand, not talking about it makes the child believe that he/she has something to be afraid of. Finally, it is particularly important for children to practice good sleep hygiene and a healthy lifestyle, since these habits will persist into adolescence, a period where parents often have less control over their child's awakening and bedtime.

### Burnout

One study measured symptoms reported by Swedish workers two years before being diagnosed with burnout. Researchers showed that 31% of these workers reported sleep disruptions during this period. In general, research shows that people suffering from burnout report a lower quality of sleep (fewer hours of sleep and poorer quality sleep during these hours). They felt less rested at awakening compared to their healthy peers. Another study measuring activity in the brain and body during sleep (known as polysomnography) showed abnormal physiological patterns of activity in these people during sleep. In fact, researchers of this study noted an increase in the activity of certain regions of the brain and the body, while these increases were not noted in people who did not suffer from burnout. Finally, researchers have shown a change in sleep architecture, characterised by a decrease in slow and deep sleep in people who suffered from burnout, which





generally indicates a decrease in restorative functions. A decrease in such functions would contribute to the fact that a person feels less rested after a night's rest and consequently, could explain why people suffering from burnout can have difficulty to function in their daily lives (ex. sleepiness, difficulties in concentration, loss of attention, etc.).

### Post-traumatic stress disorder

Sleep disruptions are the most reported symptoms in patients suffering from post-traumatic stress disorder (PTSD), considering that between 50 to 70% of these individuals have also received a diagnosis for a sleeping disorder. These people often report distress at awakening, sudden awakening, sleep apnea, nocturnal panic attacks, nocturnal terrors as well as insomnia linked to the trauma to which they were exposed. Following a trauma, it is normal for someone to have some of these symptoms appear in a transient manner. However, that is not the case for people suffering from PTSD whose symptoms continue for months and even years. It

then becomes important to seek help.

To conclude, it is important to note that it is normal to experience occasional sleep problems, for example, during stressful periods. However, when these problems persist and affect daily functioning, it is important to consult a professional. As in many other fields of research on mental health, research on sleep faces the dilemma of the chicken or the egg. Do sleep disruptions precede the onset of mental disorders or are they a consequence of these disorders? It is important to note that sleeping disorders are often, but not exclusively, observed in psychiatric populations. In fact,

**sleep disruptions are present in 50 to 80% of the psychiatric population, while they are present in 18% of the general population.**

In general, sleeping problems can be treated with medication and/or psychotherapy. To date, the most effective treatment for sleeping disorders is cog-

nitive-behavioural psychotherapy. It is the treatment of choice for sleeping disorders, while medication is recommended when the therapy does not provide the desired effects. For more information on cognitive-behavioural therapy and on ways to find a working psychologist practicing this approach, you can consult the Mammoth Magazine, Issue 16 !

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# A toolbox... to help you sleep better!

*Catherine Raymond, Ph.D. student, Center for Studies on Human Stress*  
*Sarah Leclaire, M.Sc., Center for Studies on Human Stress*

Have you exhausted all your resources? If yes, we have created a validated reference list to inform you on sleep, its different stages, various life habits that can improve sleep quality or even help you if you suffer from a sleep disorder! However, it is important to remember that consulting a physician can help you push through your worries that are related to sleep, and that solely consulting these resources (when they do not involve a health professional) may not be sufficient.

## Online resources

### **Fondation Sommeil**

Fondation Sommeil is a Quebec non-profit organization that aims to inform the population on sleep and sleep pathologies, and that works to provide resources for its members. For more information on sleep or to find a clinic (public or private) in your area :

<https://fondationsommeil.com/>

### **Société canadienne du sommeil**

This web site offers access to a wealth of information about the different types of resources and specialists that can help you. This site also contains information on upcoming events in the field of sleep (e.g., lay public conferences, etc.)

<http://scs-css.ca>

### **National Sleep Foundation**

This site offers advice to improve sleep and also provides references for specialists in the field.

<https://www.sleepfoundation.org/sleep-tools-tips/healthy-sleep-tips>

### **Snoring and sleep apnea (site available in French only)**

This site proposes scientifically validated content and resources on treatments available for snoring and sleep apnea.

<http://www.ronflement-apneedusommeil.com>

### **Clinique de médecine du sommeil (English information available on the National Sleep Foundation website, see above)**

This web resource also proposes information on different sleep disorders and available treatments. It also provides access to a reference list of diagnostic laboratories and other field specialists:

<https://www.institutdemedecinedusommeil.ca>

## To speak with a specialist

Here are a few links that will redirect you to specialists in the field of sleep that offer consultation services according to your needs.

### **Université de Montréal's University Clinics: Center for Advanced Research in Sleep Medicine**

Please note that appointments at this clinic must be made with a reference from your family doctor:

<http://www.ceams-carsm.ca/en/>

### **The Greater Montreal Sleep Clinic (snoring and sleep apnea)**

Scheduling an appointment at this clinic does not require a reference from your family doctor. Consultations are reimbursed by RAMQ, but any tests administered thereafter will be charged.

<http://www.cliniqueronflement.com/en/about-us/>

### **CLSC**

Your neighborhood's CLSC can be a great source of information and can provide various services related to sleep disorders.

### **Ordre des psychologues du Québec**

Cognitive-Behavioral Therapy has been shown to reduce certain sleep disorders. Some psychologists are specialists in sleep disorders or anxiety, which can

itself be the source of insomnia. You can refer to the Quebec College of Psychologists (OPQ) website below to find a specialist.

You can also refer to our Mammoth Magazine's 16th issue to find a guide that will help you navigate the OPQ website to find a specialist that will meet your needs.

<https://www.ordrepsy.qc.ca/trouver-de-aide>

### **Fondation Sommeil Listening Line**

Here is the phone number to contact a specialist at Fondation Sommeil.

In Quebec : **(514) 522-3901**

Toll-free number when calling elsewhere in Canada or United States:

**1-888-622-3901**

## Books

Here are two very interesting books that are renown in the scientific community of sleep research. They have been authored by sleep specialists from our Quebec Universities

### **« Overcoming the Enemies of Sleep »**

By Charles M. Morin, Ph. D,  
Psychologist and Director of the Center for Studies of Sleep Disorders, Laval University

### **« Sleep and You: Sleep Better, Live Better »**

By Diane Boivin, M.D., Ph. D.  
Professor, Faculty of Medicine & Psychiatry, McGill University

## Sleep Research Laboratories

If you wish to participate in research projects on sleep or want to learn more about normal and abnormal sleep, here are links that will direct you to the websites of three scientific laboratories that specialize in sleep research.

**Center for Advanced Research in Sleep Medicine**  
(Université de Montréal)  
<http://www.ceams-carsm.ca/en/>

**PERFORM**  
(Concordia University)  
<https://www.concordia.ca/research/perform/about.html>

**Centre d'étude des troubles du sommeil** (Université Laval; available in French only)  
<http://www.cets.ulaval.ca>

## Our Next MAMMOUTH MAGAZINE Issue

Our next issue will address associations between stress and pain. Does pain increase stress or does stress influence our perception of pain? What happens when we see someone experiencing pain? We will discuss different pain-related pathologies and explore the role of stress among them. See you soon!

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