

Sleep and seizures - the facts

- One of the most common seizure triggers for many people with epilepsy, is sleep deprivation
- Nocturnal seizures disrupt sleep and increase daytime drowsiness
- Drowsiness itself can increase the risk of daytime seizures for people affected by seizures during sleep
- Nocturnal seizures seem to be an independent risk factor for Sudden Unexpected Death in Epilepsy (SUDEP)¹
- Nocturnal seizures may be misdiagnosed as a sleep disorder and certain sleep disorders may be misdiagnosed as epilepsy (video-EEG recordings can assist with the correct diagnosis)
- Some antiepileptic medications (AEDs) can contribute to sleeping difficulties or daytime drowsiness
- Sleep apnoea is approximately twice as common in people with poorly controlled epilepsy than in the general population²
- People with epilepsy with sleep disturbances have a poorer quality of life compared to those with no sleep disturbances. Treatment of the sleep disorder improves seizure control and quality of life
- Lastly, sleep disorders can exacerbate epilepsy and epilepsy can exacerbate certain sleep disorders

Nocturnal Seizures - Seizures during sleep

Why do so many seizures happen during sleep? Read on to learn about the close association between sleep and seizures.

Epilepsy has a complex association with sleep.

Seizures during sleep can occur with any type of epilepsy. Some people have seizures occurring exclusively during sleep whilst others have both daytime and nocturnal seizures. People who have only nocturnal seizures are the ones defined as having pure nocturnal epilepsy.

The International League Against Epilepsy (ILAE) defines nocturnal seizures as 'seizures occurring exclusively or predominantly [more than 90%] from sleep.' It is estimated around 12 percent of people with epilepsy have nocturnal seizures.³

Why do nocturnal seizures occur?

Epileptic seizures are often strongly influenced by the sleep-wake cycle.⁴

It is thought that the change of state has an influence on the brains 'epileptic activity' in people with epilepsy. Some seizures also occur predominantly at a certain stage of sleep.

It's believed that nocturnal seizures are triggered by changes in the electrical activity in your brain during the transition between the different stages of sleep, and the transition between sleep and awakening stage. As an example, in wakefulness, our brain waves remain fairly constant, but during sleep there are many changes. We go to bed and transition from wakefulness to drowsiness to light sleep to deep sleep to Rapid Eye Movement (REM) sleep - and this cycle occurs 3-4 times per night. There are dramatic changes on EEG during these sleep changes.



Sleep is divided into 5 stages: Non-REM Stages 1, 2, 3, and 4 and REM sleep. Seizures don't seem to happen during REM sleep⁵, but may occur at any other time during the sleep cycle, mostly in light sleep - that is, stages 1 and 2 of sleep. Nocturnal seizures can also occur upon waking or arousal during the night.

1 <http://onlinelibrary.wiley.com/doi/10.1111/j.1528-1167.2011.03360.x/full>
2 <http://www.sciencedirect.com/science/article/pii/S1087079211000049>
3 <http://jnnp.bmj.com/content/81/2/130.full.pdf+html>
4 <http://www.ncbi.nlm.nih.gov/pubmed/21399518>
5 http://www.medscape.com/viewarticle/713994_3

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This generally means there are more common times at which nocturnal seizures happen:

- Within the first or second hour after going off to sleep (early nocturnal seizures)
- One to two hours before the usual time of waking (early morning seizures)
- Within the first hour or so after awakening (early morning seizures).

Seizures that occur during sleep may also happen during an afternoon nap - they are not limited to night time.



Stages of Sleep

| Stage 1 | Stage 2 | Stage 3 | Stage 4 | Stage 5 |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sleep Onset Non-REM sleep | Non-REM sleep | Non-REM sleep | Non-REM sleep | REM sleep |
| Drowsiness/ very light sleep, easily awoken | Light sleep | Deep sleep starts | Deep sleep | "Active" sleep. When you dream |
| This is when you start falling asleep, and is usually brief. | Your brain activity heart rate and breathing start to slow down. You begin to reach a state of total relaxation in preparation for the deeper sleep to come. | This is also known as slow wave sleep. Your brain waves further slow but there may still be short bursts of faster of brain activity. If you were to be suddenly awoken during this stage, you would be groggy and confused, and find it difficult to focus at first. | This is where you experience your deepest sleep of the night. Your brain is mostly slow wave activity, and it's difficult to wake someone up when they are in this stage. | REM sleep means rapid eye movement, which characterises stage 5. Your blood flow, breathing, and brain activity increases, but your muscles go into a paralysis-like state. The brain activity is similar to when you are awake. |

Diagnosing nocturnal seizures

It can be difficult to diagnose nocturnal seizures because they happen during sleep, and the person may not be aware of them happening. Also, nocturnal seizures can be confused with some sleep disorders.

As with most other forms of epilepsy, a good history of the seizures, or even better, an eyewitness account is very important for diagnosis. The doctor may also suggest a video sleep EEG, often done during the day after being sleep deprived.

If left undiagnosed, the person may suffer from excessive daytime tiredness on a regular basis. For children or people studying, this can impact concentration, attention and learning as well as behaviour and emotions resulting in reduced quality of life.⁶

Are there specific types of epilepsy where people have nocturnal seizures?

Nocturnal seizures can happen to anyone with epilepsy, but they are often associated with certain types of epilepsy, including:

- Juvenile Myoclonic Epilepsy (JME)
- Awakening Grand Mal (Tonic Clonic)
- Benign Rolandic (also called Benign Focal Epilepsy of Childhood)
- Electrical Status Epilepticus of Sleep (ESES or CSWS)
- Landau-Kleffner Syndrome (LKS)
- Frontal Onset Seizures (such as Nocturnal Frontal Lobe Epilepsy)

⁶ <https://sleepfoundation.org/sleep-disorders-problems/disease-and-sleep/epilepsy>

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Nocturnal seizures mostly take the form of tonic-clonic and/or focal seizures, but other seizure types may also happen. Sometimes they are too subtle to detect.

Can they change to daytime seizures?

If a person maintains a pattern of only having seizures during sleep for several years, the probability of the seizures happening during wakefulness is small⁷. However this does not mean daytime seizures won't occur. There may be situations where someone with nocturnal epilepsy is put under duress, such as extreme stress or sleep deprivation, medication changes or withdrawal, all which lower their seizure threshold and increasing the risk of a seizure, day or night. Daytime seizures may also occur if someone with nocturnal epilepsy decides to take a nap, or even become excessively drowsy during the day.

With good seizure and lifestyle management however, the risks of a daytime seizure can be greatly reduced.

How are they managed?

It is important to aim for the best seizure control possible because nocturnal seizures can interrupt sleep, sometimes quite a lot. This can then become a cycle of sleep deprivation, which is a known trigger for seizures, and consequently more seizures.

Treatment of nocturnal seizures is similar to seizures of a similar nature that occur during the waking hours although sometimes the specialist may recommend a higher evening dose of antiepileptic medication (AED).

Medical management of seizures is based on the type of seizures rather than on the time of occurrence.

Practice good sleep habits

Some tips for getting a good nights sleep include:

- Maintain the same bedtime and rising times as much as possible.
- Work with your internal body clock, so don't ignore tiredness, go to bed when your body tells you so.
- Make sure your bedroom is a restful and calm place to be. Keep it dark at night and open the blinds when you wake up.
- Shift work is not recommended as it affects sleep times and quality of sleep.⁸
- Some people who have difficulties sleeping, or have interrupted sleep, use sedatives which may ultimately aggravate the problem. Try to improve your sleep regime with more natural techniques.
- People with excessive daytime sleepiness often resort to coffee or other forms of stimulants to overcome this, a practice that can also exacerbate seizures, especially if the stimulating substance is used in large amounts. Avoid any caffeinated products or stimulating substances after lunch as this can also affect sleep quality.
- Regular exercise can improve a restful sleep. Don't exercise within four hours of bedtime though.
- Keep evening activities calm or use relaxation techniques or behavioural training to establish a more efficient sleep pattern. If there are things you are worried about, don't think about them just before bedtime.
- A regular routine is vital with some people.
- If you have tried and failed to improve your sleep, there are many sleep specialists that can help.
- For more sleep tips go to http://www.adelaide.edu.au/counselling_centre/resources/brochures/zzs.html



Safety

Having a seizure in bed, particularly if you live or sleep alone, poses a number of safety risks. For a person with nocturnal seizures, it is suggested:

⁷ http://www.medscape.com/viewarticle/713994_2

⁸ https://www.researchgate.net/profile/Torbjoern_Akerstedt/publication/10854998_Shift_work_and_disturbed_sleepwakefulness/links/53d342080cf228d363e973de.pdf

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- Choose a low bed, avoid sleeping in a top bunk.
- Keep heavy or sharp cornered furniture away from the bedside to prevent injury during a fall.
- Consider using a safety mat on the floor next to the bed if the person tends to fall out of bed during seizures. Such mats are similar to those used in gyms and can be bought at the hardware or rubber store.
- Wall mounted lamps pose less safety risks than ordinary table lamps or study lamps, which can be easily knocked over.
- Smoking in bed is unwise for anyone and particularly so for a person with seizures. Consider using non-flammable bedding and a smoke alarm if you are a smoker.
- There are a number of devices for night-time seizure monitoring that are now available for use in the home. They are designed to recognise that a seizure has occurred or that breathing has been disrupted, triggering an alarm so that assistance can be provided. This is a rapidly developing area of research. Investigation into the development and the benefit of such monitors is ongoing and at this time there is no evidence to show that using an alarm or device can guarantee the safety of a person experiencing nocturnal seizures. However, some families have found monitors to be a useful part of a risk reduction plan. Speak to your clinician about whether a device is something that you might choose to use.
- Some people advocate for the use of special pillows to allow better airflow around the face. The use of special pillows has not been proven to prevent death from suffocation nor guarantee the safety of a person having nocturnal seizures. The use of a special pillow is a personal choice.
- If there is someone available to help you if you have a seizure, check they know how to put you into the recovery position (onto your side) and what to do in case of emergency. Download a free seizure first aid poster from epilepsy.org.au.
- Finally, people who experience seizures exclusively during sleep may be able to drive.

Summary

There is an inherent relationship between sleep and epilepsy. Sleep activates the electrical discharges in the brain that result in seizures and seizures are timed according to the sleep wake cycle. For some people, seizures occur exclusively during sleep. If these seizures aren't detected or diagnosed, they can result in years of daytime fatigue and concentration problems without ever knowing why.

For people with epilepsy, sleep difficulties are a double-edged sword; epilepsy disturbs sleep and sleep deprivation aggravates epilepsy. People with epilepsy also have a higher incidence of sleep disorders, especially sleep apnoea. The drugs used to treat epilepsy may also impact on sleep.

Because lack of sleep is a trigger for seizures, achieving healthy sleep on a nightly basis is essential for people with epilepsy. For someone with nocturnal seizures, this means good seizure management to prevent seizures.

Further reading and help

EAA website for safety tips <http://www.epilepsy.org.au/about-epilepsy/living-with-epilepsy/safety>
Epilepsy and Sleep: Neurologist Dr Dan McLaughlin talks about epilepsy and sleep <https://www.youtube.com/watch?v=Wvk2WocwRP8>

Relaxation: There is an App called Brainwave which combines binaural tones with relaxing ambient music, soothing nature sounds, or your own iTunes Music to help you relax and sleep.

Epilepsy and sleep apnoea <http://www.abc.net.au/news/2013-06-02/link-between-epilepsy-and-obstructive-sleep-apnoea/4728076>

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This information is given to provide accurate, general information about epilepsy. Medical information and knowledge changes rapidly and you should consult your doctor for more detailed information. This is not medical advice and you should not make any medication or treatment changes without consulting your treating clinician.

