Patient Guidelines for Central Disorders of Hypersomnolence

How to navigate living with a sleep disorder

Welcome

These guidelines are designed to offer patient guidance and education on central disorders of hypersomnolence (CDoH), including narcolepsy, idiopathic hypersomnia, and Kleine-Levin syndrome. They offer a comprehensive description of each sleep disorder, including diagnostic practices and treatment options. These guidelines aim to increase understanding for both people living with CDoH and their support networks, ultimately leading to an improved quality of life.

-- SLEEP CONSORTIUM

Glossary

Autonomic Nervous System (ANS)	A section of the nervous system that controls and regulates functions of the internal organs.
Cataplexy	The sudden loss of muscle control brought on by strong emotion. It can vary from muscle weakness to a complete loss of muscle control.
Central Nervous System (CNS)	The body's control center, which is made up of the brain and spinal cord. It controls most functions of the body and mind.
Circadian Rhythm	The body's internal clock, which controls your sleep cycle, hormones, and hunger level.
Comorbidities	Having two or more medical conditions or illnesses simultaneously.
Electroencephalogram (EEG)	Type of test to record and measure the brain's electrical activity.
Excessive Daytime Sleepiness (EDS)	Daily periods of an overwhelming need to sleep, or lapses into drowsiness or sleep. It can interfere with daily activities. EDS is often a symptom of a sleep disorder.
Functional Outcomes Of Sleep Questionnaire (FOSQ)	A type of sleep questionnaire that can help determine underlying sleep conditions and illnesses.

Glossary Continued...

Hypersomnia	A sleep disorder characterized by excessive sleepiness during the day while still getting an appropriate amount of sleep during the night.
Idiopathic Hypersomnia (IH)	A sleep disorder characterized by chronic, excessive daytime sleepiness without an obvious cause. "Idiopathic" means the specific cause is unknown. Individuals experience profound EDS, long periods of sleep, and sleep inertia.
Kleine-Levin Syndrome	A rare and complex neurological disorder, often characterized by recurring periods of excessive sleep, altered behavior, and a reduced understanding of the world. Episodes involve sleeping up to 20 hours a day.
Maintenance Of Wakefulness Test (MWT)	A type of sleep study designed to measure how well a person can stay awake in a quiet, relaxing environment. It is used to assess the effectiveness of treatment for sleep disorders that cause EDS.
Melatonin	A hormone produced naturally in your brain, It is called the "sleep hormone" because it helps regulate the sleep-wake cycle.
Melatonin Supplements	A supplement that contains the hormone melatonin. They are commonly used to assist with sleep-related issues for short-term use.

Glossary Continued...

Multiple Sleep Latency Test (MSLT)	A diagnostic tool used to measure the speed at which a person falls asleep (sleep latency) and how often/quickly a person enters REM sleep in a series of short naps scheduled throughout the day. It's often used to diagnose disorders that cause excessive daytime sleepiness, such as narcolepsy and idiopathic hypersomnia.
Narcolepsy Type 1	A chronic neurological disorder characterized by excessive daytime sleepiness and cataplexy. This condition is caused by a deficiency of orexin/hypocretin, which are crucial for regulating wakefulness.
Narcolepsy Type 2	A chronic neurological disorder characterized by excessive daytime sleepiness, but unlike Type 1, it does not involve cataplexy. It is typically associated with less severe symptoms and does not involve the loss of hypocretin.
Non-REM Sleep	One of the two basic states of sleep. It's characterized by slower brain waves and a lack of rapid eye movement. It is divided into three stages (N1, N2, and N3).
Obstructive Sleep Apnea (OSA)	A common sleep disorder characterized by repeated interruptions in breathing during sleep. These interruptions, known as apneas, occur when the muscles in the throat relax excessively, causing a partial or complete blockage of the airway. As a result, breathing stops for a brief period, leading to reduced oxygen levels in the blood.

Glossary Continued...

Off-Label	The use of a pharmaceutical drug for an unapproved indication, age group, dosage, or form of administration.
Orexin or Hypocretin	A neuropeptide in the hypothalamus region of the brain that plays a crucial role in regulating wakefulness, arousal, and appetite.
Polysomnography (PSG)	A sleep study used to diagnose sleep disorders. During this test, various bodily functions are monitored while you sleep, including brain waves, oxygen levels in your blood, heart rate, breathing, as well as eye and leg movements.
REM Sleep	One of the two basic states of sleep. It is characterized by rapid movement of the eyes under the eyelids. It is the stage of sleep where the brain is very active, the body is temporarily paralyzed, and the most vivid dreams occur.
Sleep Diary	A self-recorded log used to track an individual's sleeping patterns. It typically includes details like the time you go to bed, the time you wake up, the total hours of sleep, the quality of sleep, any awakenings during the night, and how you feel in the morning.

Glossary Continued...

Sleep Efficiency	A measure that reflects the quality of your sleep. It's calculated by dividing the total time spent asleep (not just lying in bed) by the total time spent in bed, then multiplying the result by 100 to get a percentage.
Sleep Hygiene	A behavioral practice that promotes healthy habits to get a good night's sleep.
Sleep Inertia	The feeling of disorientation and impaired cognitive function that can occur just after waking up. It's the transitional state between sleep and wakefulness, where your brain is still in a sleep-like state.
Sleep Paralysis	An unusual phenomenon in which the body cannot move (paralysis) while being conscious after waking up.
Sleep Stages	The four stages of sleep include one for rapid eye movement (REM) sleep and three for non-REM.

Introduction to Sleep*

Everyone needs sleep. But we all do not get the amount of sleep we need to function optimally. It is also not just the number of hours of sleep you get that is vital. It is the quality of your sleep that also matters. Restorative sleep is essential for physical, emotional, and cognitive well-being.

Importance of Sleep

Getting good sleep is as vital for good health as exercise and diet. Several processes occur while you are sleeping. According to the National Institute of Neurological Disorders and Strokes, researchers think that sleep may help remove certain toxins in the brain that may build up when you are awake. Think of the sleeping brain as similar to a kidney for the body, removing toxins.

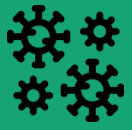
Different repair processes in the body also occur during sleep. Sleep affects most systems of the body, such as the brain, immune system, and heart.

If you do not get enough sleep, it can affect the following:


Mood


Weight


Memory


Immune system

And potentially increase the risk of heart disease, high blood pressure, and dementia.

Circadian Rhythm Cycle *24-hour period*

Your circadian rhythm is the behavioral, physical, and mental process that occur during a 24-hour period. The circadian rhythm is a natural cycle that mostly responds to light and dark. Your circadian rhythm helps make sure your bodily functions are optimal at certain points during a 24-hour period. It allows you to be most alert during the day and tired at night to promote sleep.

Circadian rhythms are connected to the suprachiasmatic nucleus (SCN) in the hypothalamus. The SCN is sensitive to light. This is why circadian rhythms are largely connected to day and night.

Circadian rhythms affect different functions in the body, including:

Below is an average circadian rhythm cycle:

Early Morning: Energy is at its lowest. Some people do not feel fully awake until about 9 am.

Mid-morning to early afternoon: Energy rises along with body temperature. This is often between 10 am and 1p.m for most people.

Afternoon: Energy may dip. Some people may feel like they need a nap or a snack.

Evening: Melatonin levels rise, which promotes sleepiness.

Stages of Sleep

When you sleep, you go through different stages. Each stage may affect your body differently. Although there are some variations, usually, the cycle starts over about every 80 to 100 minutes. According to the National Blood, Heart, and Lung Institute, most people experience about four to six cycles nightly.

Non-REM:

01

Non-REM sleep is the non-rapid eye movement stage. It has three substages, including:

Stage 1 NREM:

02

This is the transition from wakefulness to sleep. Your breathing may slow, and muscles may twitch. This stage is relatively short, usually lasting about 10 minutes.

Stage 2 NREM:

03

During this stage, eye movements stop, and body temperature starts to drop. Your brain produces sleep spindles, which are rapid rhythmic brain waves and K-complexes (sudden increases in wave amplitude). Most people spend about half their time in this stage of sleep each night.

04

Stage 3 NREM:

Your muscles relax, and blood pressure starts to drop in this stage. This is where the deepest sleep occurs. Most people usually spend more time in this stage early in the night. This phase is crucial for physical recovery and growth.

05

REM Sleep:

During this stage, the eyes move or twitch. The brain becomes more active. This is the stage dreaming occurs. Your body becomes relaxed and immobile. REM sleep typically begins about 90 minutes after falling asleep and recurs about every 90 minutes.

Sleep Recommendations by Age:

Individual sleep needs may vary. But in general, according to the Centers for Disease Control and Prevention, sleep recommendations by age include:

- Newborn: 14-17 hours
- Infant: 12-16 hours
- Toddler: 11-14 hours
- Preschool: 10 to 13 hours
- School-age: 9 to 12 hours
- Teen: 8 to 10 hours
- Adult: 7 to 9 hours

Sleep Hygiene
Daily Habits

Be Physically Active

Don't Smoke

Get Daylight Exposure

Reduce Alcohol Consumption

Cut Down on Late Caffeine

Don't Dine Late

Restrict In-Bed Activity

Sleep Hygiene Nightly Routine

Budget Time For Winding Down

30

Keep Your Routine Consistent

Dim Lights

Unplug From Electronics

Meditate to Relax

Sleep Hygiene In Your Bedroom

Reduce Noise

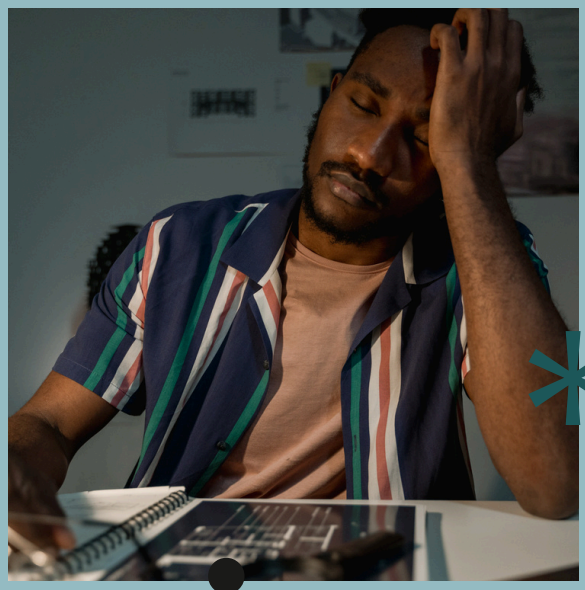
Use Comfortable Bedding

Block Out Light

Set a Cool Yet Comfortable Temperature

Try Calming Scents

Have a Comfortable Mattress and Pillow



Overview of CDoH

Central disorders of hypersomnolence. (CDoH) cause excessive daytime sleepiness. But there is much more to CDoH than just feeling tired during the day. These disorders can have varied symptoms and impact quality of life. They can also take some trial and error in finding the best treatments and lifestyle adjustments. Learning as much as possible about CDoH is the first step in getting a correct diagnosis and the right treatment plan.

What are CDoH?

CDoH involves disorders that cause excessive daytime sleepiness regardless of the amount of sleep a person gets. To receive a diagnosis of CDoH, excessive daytime sleepiness is not attributed to or caused by another medical condition or treatment. CDoH can be associated with increased total daily hours of sleep but without feeling restored. Some people have unintended lapses into sleep or drowsiness.

Types of CDoH

Doctors classify CDoH into different types. Each type may have somewhat different symptoms and associated characteristics. Each form of CDoH is considered a primary hypersomnia.

Narcolepsy type 1

People with narcolepsy type 1 have excessive daytime sleepiness. They have uneven and disrupted nighttime sleep that may include waking up frequently. Individuals with narcolepsy may fall asleep suddenly and unwillingly in the middle of an activity, such as eating or driving. This obviously is very disruptive to a person's life. Narcolepsy type 1 also involves cataplexy. Cataplexy involves losing muscle tone while awake, usually due to an emotional trigger.

Narcolepsy type 2

Narcolepsy type 2 includes the symptoms above, except it occurs without cataplexy. People with type 2 also experience excessive daytime sleepiness, disrupted sleep, and unwillingly falling asleep during an activity. However, they tend to have less severe symptoms than people with type 1 narcolepsy.

Kleine-levin syndrome

Kleine-Levin syndrome involves reoccurring bouts of hypersomnia. In addition to excessive sleepiness, it often occurs with behavioral and psychiatric problems. The episodes can last for days, weeks, or months. Symptoms than ease, and people with the condition may have normal functioning between episodes. The condition occurs most frequently in young males.

Idiopathic hypersomnia

Idiopathic hypersomnia means someone has an excessive need for sleep, but there is no known cause. Symptoms associated with IH, include prolonged and nonrestorative nighttime sleep, severe sleep inertia, and long, unrefreshing naps. A person given a diagnosis of idiopathic hypersomnia does not meet the criteria for one of the other types of CDoH.

Symptoms of CDoH

Symptoms of CDoH can vary depending on the specific type. But each disorder involves disrupted sleep/wake patterns. Symptoms may vary in severity and include:

- Excessive daytime sleepiness
- Difficulty staying awake during the day
- Disrupted nighttime sleep
- Depression or other mood disturbances (in some cases)
- Sleep hallucinations (in some cases)
- Having trouble waking up from sleep (sleep inertia)
- Cataplexy (in narcolepsy type 1)

Diagnosis of CDoH

Doctors make a diagnosis of CDoH based on a combination of medical history, symptom review, and physical exam. Sleep studies also play a large role in making a diagnosis.

In some cases, additional diagnostic tests, such as blood tests, are recommended to identify genetic markers and rule out other medical conditions that may cause similar symptoms. Doctors may also suggest patients keep a sleep diary to help their sleep specialist determine sleep disruptions and habits that may affect sleep quality.

Possible sleep studies include–

Multiple sleep latency test:

A diagnostic tool used to measure the speed at which a person falls asleep (sleep latency) and how often/quickly a person enters REM sleep in a series of short naps scheduled throughout the day.

Polysomnogram:

This test usually involves an overnight study to monitor various bodily functions while you sleep. These include brain waves, oxygen levels in your blood, heart rate, breathing, as well as eye and leg movements.

Management of CDoH

Treatment for CDoH often includes a combination of medication and sleep hygiene strategies. Pharmacological treatment may involve different classifications of drugs.

Types of drugs used to treat CDoH include:

- Wake-promoting medications
- Stimulants
- Serotonin and norepinephrine reuptake inhibitors
- Tricyclic antidepressants
- Oxybate therapy

Lifestyle changes may include the following:

- Avoiding caffeine and excess alcohol
- Creating a comfortable sleep environment that is quiet, dark, and cool
- Getting regular exercise
- Having a consistent sleep and wake time including daytime naps
- Eating a low-carb diet

Specific symptomology, etiology, and clinical presentation

Narcolepsy Type 1

(Narcolepsy with cataplexy)

Narcolepsy is a neurological disorder affecting a person's ability to control their sleep/wake cycle. Commonly, people with narcolepsy experience excessive daytime sleepiness and uncontrolled, sudden episodes of sleep.

Doctors divide narcolepsy into two subtypes, including type 1 and type 2. People with type 1 narcolepsy receive that diagnosis based on the presence of cataplexy or having low levels of hypocretin, which is a neuropeptide in the brain.

Cataplexy involves the brief loss of muscle tone while a person is still awake. This leads to the loss of voluntary muscle control and weakness. In severe episodes of cataplexy, a person may not be able to speak and may "melt" completely to the ground.

Usually, cataplexy occurs as a response to strong emotions. The emotions that may trigger an episode of cataplexy can include:

Fear Laughter Sadness Excitement

In the United States, the prevalence of all types of narcolepsy is about 1 in every 2000 people. But that number may be higher. Estimates are that only about 25 percent of people with narcolepsy receive a proper diagnosis and treatment. Misdiagnosis is very common.

Causes

There appears to be a connection between low levels of the brain chemical hypocretin and narcolepsy type 1. Hypocretin helps control when a person is awake and when they enter REM sleep. In people with type 1 narcolepsy, levels of hypocretin are often low.

The exact cause of low levels of hypocretin is not always known. But it may occur due to an abnormal autoimmune reaction. This abnormal reaction by the immune system may cause the body to attack the hypocretin-producing cells.

According to the Mayo Clinic, if you have a close family member with narcolepsy, your risk of developing the condition is 20 to 40 times higher than the general population.

Symptoms

The symptoms of narcolepsy type 1 can start at any time. But usually, the onset tends to occur at around age 15. There appears to also be a second peak of symptom onset at around age 35.

In general, the average onset of symptoms to diagnosis is seven years. However, since most people with type 1 narcolepsy have cataplexy, a correct diagnosis may be secured sooner.

Possible symptoms include the following:

01 Excessive daytime sleepiness

Since normal sleep becomes disrupted, people with narcolepsy feel very sleepy during the day, oftentimes with an irresistible urge to nap.

02 Disrupted nighttime sleep

Nighttime sleep patterns are abnormal. A person with the condition may wake up several times during the night. They also may move too quickly into certain sleep stages, such as REM sleep. It is also common for a person with narcolepsy to have excessive shifts between stages during sleep.

03 Cataplexy

A sudden loss of muscle tone is triggered by intense emotions such as joy, anger, fear, or surprise ranging from drooping of the jaw or buckling at the knees to a full body collapse. Cataplexy episodes can last up to a few minutes and frequency varies.

04

Sleep paralysis:

This is a phenomenon that occurs either at the onset of sleep or upon waking, where an individual is conscious but unable to move or speak. It usually occurs during the transitions in and out of REM sleep. It usually only lasts a few seconds to minutes.

05

Hypnopompic/ hypnagogic hallucinations:

This type of hallucination occurs when a person first wakes up, or as someone is falling asleep. The hallucinations are typically vivid, multi-sensory, and feel real and oftentimes frightening.

Clinical presentation

Someone with narcolepsy type 1 may present with some or all of the symptoms listed above.

However, doctors do not make a diagnosis based on symptoms alone. Narcolepsy type 1 is diagnosed through a sleep study and supported by the presence of the genetic marker HLA-DQB1*

During a sleep study, an individual with type 1 narcolepsy will typically move into REM sleep abnormally quickly. REM sleep or rapid eye movement is when dreaming happens. Usually, most people enter REM sleep about 90 minutes after they fall asleep. However, someone with narcolepsy tends to enter REM sleep within 15 minutes of falling asleep.

For someone to receive a diagnosis of narcolepsy type 1, they must meet the following criteria:

- Have daily periods of irrepressible need to sleep or daytime lapses into drowsiness or sleep
- The presence of cataplexy, or low levels of hypocretin in the cerebral spinal fluid
- A sleep study (Multiple Sleep Latency test and Polysomnogram) demonstrating early onset of REM

Narcolepsy Type 2

(without cataplexy)

Type 2 narcolepsy occurs without cataplexy. Symptoms also tend to be milder with type 2 narcolepsy than type 1.

Causes

The cause of type 2 narcolepsy is not entirely known. In people with type 1, their level of hypocretin, a neuropeptide in the fluid surrounding the spinal cord and brain, is low. But levels of hypocretin are usually normal in people with type 2 narcolepsy.

Researchers theorize that type 2 narcolepsy may become triggered by an infection, head trauma, or a disease that affects the brain in people who have a genetic susceptibility. Another theory is type 2 narcolepsy may be a precursor to type 1.

Symptoms

The symptoms of type 2 narcolepsy are similar to type 1 but without cataplexy. Symptoms may include the following:

01

Excessive daytime sleepiness

Similar to type 1 narcolepsy, people with type 2 also have excessive daytime sleepiness. Unintentional lapses into sleep come on suddenly and, are present for at least three months, and must occur for a diagnosis.

02

Disrupted nighttime sleep

Nighttime sleep patterns are abnormal in people with narcolepsy type 2. An individual with type 2 may wake up multiple times during the night. They also may move too quickly into certain sleep stages, such as REM sleep.

03

Sleep hallucinations

As with narcolepsy type 1, sleep hallucinations involve a feeling of being watched, touched, or hearing or seeing people who are not in the room.

04

Sleep paralysis

This is a phenomenon that occurs either at the onset of sleep or upon waking, where an individual is conscious but unable to move or speak. It usually occurs during the transitions in and out of REM sleep. It usually only lasts a few seconds to minutes.

Clinical presentation

The clinical presentation for someone with type 2 narcolepsy is similar to that of type 1. However, the person will not report cataplexy. Symptoms listed above may range in severity.

An individual with type 2 narcolepsy may also clinically present with the following:

- No history of cataplexy
- Sudden lapses into sleep present for at least three months
- Movement into rapid eye movement sleep within 15 minutes of onset of sleep during at least 2 daytime naps on the MSLT or indicated through a nighttime polysomnogram
- Scores on the Epworth Sleepiness Scale indicate moderate to severe sleepiness
- On the multiple sleep latency tests, which involve scheduled naps, an individual with narcolepsy, will have an average sleep latency of less than or equal to 8 minutes

It is common for individuals with type 1 or 2 narcolepsy to develop a mood disorder, such as depression which often leads to a mis-diagnosis.

Idiopathic Hypersomnia

Idiopathic hypersomnia is one type of central disorder of hypersomnolence. It is a long-term neurologic condition that involves an insatiable need to sleep. The need for sleep is not satisfied or eased even with a full night's sleep.

An individual with the condition either sleeps a normal number of hours each night or more than a normal number of hours but still feel extremely sleepy during the day. Taking a nap does not reduce sleepiness.

There are also subtypes of idiopathic hypersomnia based on the total sleep time, including:

- idiopathic hypersomnia with long sleep time
- idiopathic hypersomnia without long sleep time

People with idiopathic hypersomnia with long sleep time may sleep for 11 hours or more in a 24-hour period. They may also have prolonged naps of up to three hours. Even with that much sleep, they do not feel refreshed.

Idiopathic hypersomnia is an uncommon disorder. It is thought to occur in about 1-2 people out of every 10,000. However, it is possible that some cases are misdiagnosed or the individual does not seek medical attention for a diagnosis.

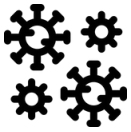
Causes

Idiopathic hypersomnia is a brain and central nervous system disorder. According to the Hypersomnia Foundation, the exact cause of idiopathic hypersomnia is unclear. A combination of factors may play a role in the development of the condition. This may include physiological factors. For example, it may develop due to a chemical imbalance in the area of the brain that controls sleep and wakefulness.

One theory is idiopathic hypersomnia might occur due to an excess of a molecule in the cerebrospinal fluid that may act as an anesthetic. Researchers are still determining the composition of the molecule. However, it may interact with y-aminobutyric acid (GABA), which helps promote sleep. Genetic predisposition may also increase the risk of idiopathic hypersomnia.

Research indicates that about one-third of people with idiopathic hypersomnia have a positive family history. This may include a family member with idiopathic hypersomnia or other central disorders of hypersomnolence.

Certain factors may also play a part in triggering the condition, such as:



Viral illnesses

Mild head trauma

General anesthesia

Symptoms

Although it may vary, symptoms of idiopathic hypersomnia may first appear in a person's teens or the early twenties. The average age of onset of the disorder is 22.

The severity of symptoms may also vary. The symptoms may worsen or even stop. Symptoms remit in about 10-15 percent of people with the condition.

01 Sleep inertia - the feeling of disorientation and impaired cognitive function that can occur just after waking up. It's the transitional state between sleep and wakefulness, where your brain is still in a sleep-like state.

02 Unrefreshing sleep

03 Sleep-to-wake transition is prolonged

04 Many people sleep 11+ hours a night

05 Brain fog

Clinical Presentation

People with idiopathic hypersomnia may present with similar symptoms that vary in intensity. However, it is common for everyone with the condition to present with excessive daytime sleepiness. Excessive daytime sleepiness occurs on most days for at least three months.

In most cases, a sleep specialist orders a polysomnogram to exclude other sleep disorders. A completed medical history and exam also exclude other causes of hypersomnia, such as a mental disorder, medication side effects, substance use, or a medical or neurological disorder.

In the cases of idiopathic hypersomnia, polysomnography rules out other causes of daytime sleepiness.

Clinical presentation also may find the following:

- Polysomnogram shows a short sleep latency
- Increased total sleep time, which must be longer or equal to 660 minutes.

Criteria for diagnosis according to the International Classifications of Sleep Disorders, the third edition includes:

- Daily periods of insatiable need to sleep
- No cataplexy
- No evidence of insufficient sleep noted from a sleep diary
- Findings from the multiple sleep latency test include sleep latency of greater than eight minutes or total sleep time greater than or equal to 660 minutes on a 24-hour polysomnogram
- Symptoms of hypersomnolence that are not better explained by a different condition or sleep disorder

Kleine-Levin Syndrome

Kleine-Levin syndrome is considered a rare disorder that causes an excessive need for sleep along with other symptoms. Doctors classify Kleine-Levin as a type of central disorder of hypersomnolence.

The condition occurs less commonly than some other forms of hypersomnolence. According to the Cleveland Clinic, Kleine-Levin syndrome occurs in about 1 to 2 people per million.

For unknown reasons, it appears to occur more often in males. According to the National Institute of Neurological Disorders and Stroke, about 70 percent of people living with Kleine-Levin syndrome are male.

The condition causes an excess need for sleep, sometimes 20 hours per day or more. But it also often causes additional symptoms related to mood and behavior.

Symptoms appear to come in cycles, or episodes. Someone may have symptoms for weeks or months. But then the affected person may go without symptoms for several weeks or even months. Doctors do not fully understand why symptoms appear to go into remission but then reappear.

In certain people, the symptoms associated with the syndrome disappear as the person ages. But the symptoms may reappear a few years later.

Causes

Doctors do not know the exact cause of Kleine-Levin syndrome. Because the condition is rare, research into the cause and treatment is not as extensive as with other diseases.

According to the National Organization for Rare Diseases, one possible cause is that damage or a malfunction to the part of the brain that regulates sleep, body temperature, and appetite may occur in people who develop the condition.

Researchers have also noted that symptoms of Kleine-Levin syndrome may develop after a flu-like illness. This indicates that a reaction by the immune system may trigger the syndrome in some people.

One study performed by Standford University found that 72 percent of people studied had an infection before the start of symptoms of Kleine-Levin syndrome. But more research is needed to determine the exact cause.

Symptoms

Symptoms of Kleine-Levin syndrome often start suddenly. Symptoms typically start in adolescence or the early 20s.

Possible symptoms include the following:

01

Excessive need for sleep

People with Kleine-levin syndrome may sleep between 18 and 20 hours daily. They may only get up to eat and use the bathroom. Although someone affected with the syndrome can be awakened, they may be listless.

02

Overeating

Compulsive eating is also often a symptom of the condition. It is common for weight gain to occur.

03

Behavioral changes

Some people develop an unlimited and uninhibited sex drive. An individual with the syndrome may also have childish behavior, such as outbursts or inability to control emotions.

04

Hallucinations

Confusion may also occur. In some instances, someone with the condition may experience hallucinations.

05

Mood disturbances

Irritability, aggression, and depression may occur. Suicidal ideation may occur in a small percentage of people.

Symptoms may last for several weeks and then resolve. When someone is not having an episode, they may not have any mood or behavioral issues or exhibit any symptoms.

Although mood disturbances can develop with Kleine-Levin syndrome, the condition is not caused by a mood disorder. It is important for clinicians to distinguish between a mood disorder, such as depression, and Kleine-Levin syndrome.

Clinical presentation

Someone with Kleine-Levin syndrome may present with some or all of the symptoms listed above. Clinical presentation may include an overweight appearance and a lack of energy.

If someone is experiencing an episode, further examination may show a lack of emotions or inappropriate behavior. The patient may also appear confused or detached. In some instances, they may present with problems speaking or slurred speech.

Usually, doctors make a diagnosis based on symptoms and rule out other conditions. Certain medical tests may help make a diagnosis, such as a psychological evaluation and blood tests to check for substance use. A physician may also recommend a sleep study to rule out other causes of excessive sleepiness.

Diagnostic Testing

Getting a correct diagnosis of central hypersomnolence disorders is critical to starting the most appropriate treatment plan. Diagnostic tests help rule out certain sleep disorders, which may cause daytime sleepiness. In some cases, a combination of different diagnostic tests may be needed to confirm a diagnosis.

The following pages include some of the possible diagnostic tests for central disorders of hypersomnolence.

Polysomnography (PSG)

PSG usually involves an overnight study to measure certain body functions while you are sleeping. To take the measurements, technicians hook you up to different monitors.

The functions measured include:


Brain waves


Eye movement


Leg movement

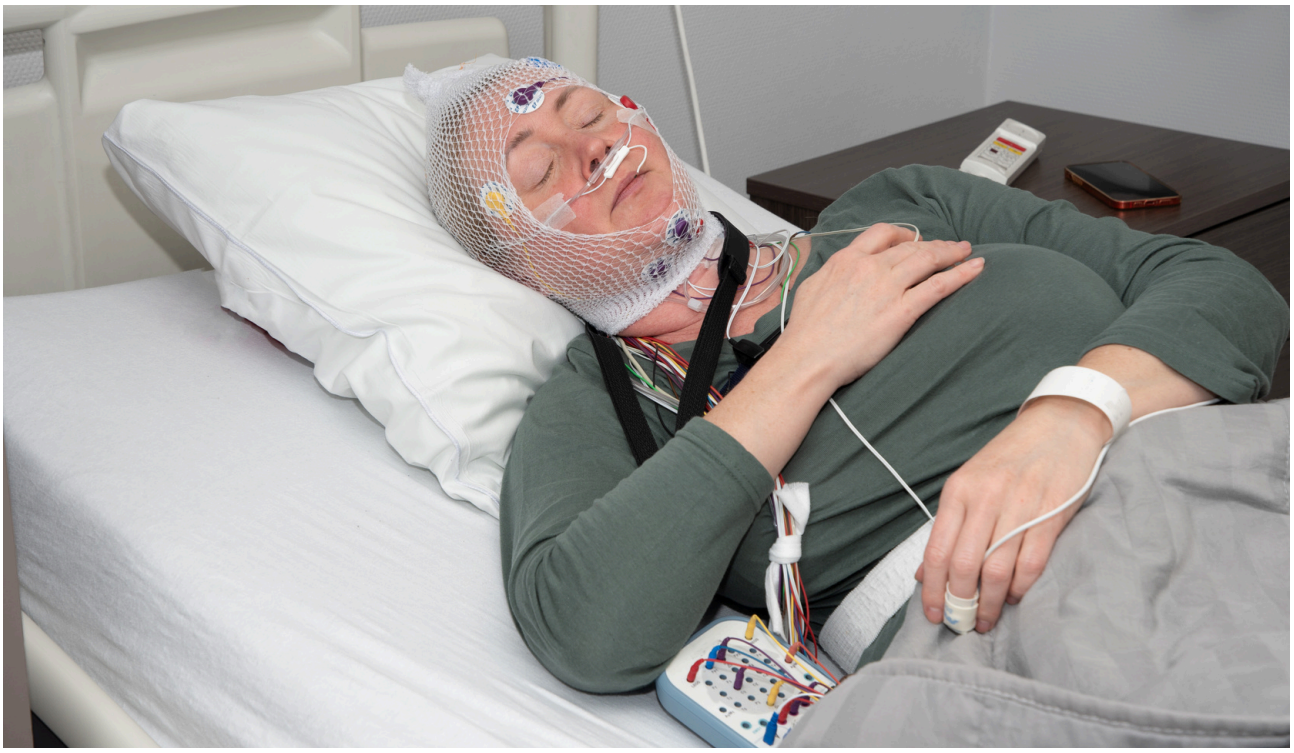

Heart rate


Respiratory rate

Oxygen level

A PSG may help rule out other sleep disorders contributing to daytime sleepiness. Results of a PSG that may indicate central disorders of hypersomnolence include:

- Increase in the amount of stage 1 non-REM sleep
- Disruption in normal sleep pattern
- Frequent awakenings
- High periods of limb movements



Multiple Sleep Latency Test (MSLT)

The MSLT is used to measure the level of daytime sleepiness a person has throughout the day.

The test, also called a nap study, involves five opportunities to nap at specific intervals. You will be hooked to sensors that show when you are asleep and awake. The test measures how long you take to fall asleep and whether you go into REM sleep.

Generally, people with hypersomnia fall asleep faster than those without the condition.

According to the American Academy of Sleep Medicine, people with narcolepsy usually have two or more REM sleep stages during the test. Individuals with idiopathic hypersomnia may fall asleep fast but do not reach REM sleep during the test.

Actigraphy

Actigraphy is a diagnostic test that involves recording information over several days to weeks to identify abnormalities within a person's sleep schedule.

During actigraphy, you wear a small device called an actigraph. Usually, the device is worn on the wrist. It collects data based on your movements as you go about your regular routine.

The device calculates sleep parameters, including:

- The time you fell asleep
- Wakening time
- Total sleep time
- The time it took to fall asleep
- The parameters help your sleep specialist identify abnormalities in conjunction with sleep diaries.

Sleep Diaries

Your doctor will likely ask you to keep a sleep diary. The diary is a log that helps your sleep specialist identify sleep disruptions and habits that may affect sleep quality.

Things you will record in your sleep log include:

- The time you went to sleep
- Wake-up time
- How long it took to fall asleep
- Daily medications
- The number and duration of naps each day
- The use of caffeine, alcohol and tobacco

Genetic Markers

Genetic markers involve blood tests to determine if you have specific genes associated with the development of some forms of central disorders of hypersomnolence. For example, the genetic marker HLA DQB1*0602 is linked to narcolepsy.

Maintenance of Wakefulness Test (MWT)

The MWT is a sleep test that measures your ability to stay awake for a certain period.

During the test, you will likely be required to stay awake during four 20 to 40-minute periods. The periods are two hours apart. Recording devices determine if you can remain awake during the 20 to 40-minute period.

Lumbar Puncture

A lumbar puncture may help diagnose specific forms of central disorders of hypersomnolence. The procedure involves the physician inserting a needle into the lower back between two vertebrae. The doctor removes a sample of cerebrospinal fluid, which is analyzed in the lab.

Doctors are measuring the level of hypocretin-1, which is a neuropeptide associated with the sleep/wake cycle. Low levels may indicate narcolepsy type 1. Doctors consider hypocretin-1 levels above 200 pg/mL as normal. Levels below 110 pg/mL may indicate narcolepsy.

Pharmacology for CDoH

Currently, there is no cure for central disorders of hypersomnolence (CDoH). However, treatment may help ease symptoms, which improves quality of life.

Treatment for central disorders of hypersomnolence may include lifestyle changes to promote better sleep. But one of the main treatments involves medications.

Doctors may recommend different pharmaceuticals based on the specific diagnosis. In addition, not every drug is effective for each individual. Sometimes, it may take some trial and error to determine the best medication and dosage.

The American Academy of Sleep Medicine recommended certain medications to treat CDoH. Different classifications of medications are an option, including the following:

Wake-Promoting Agents or Stimulants:

These types of medications help people stay awake during the day.

Examples of wake-promoting agents used to treat CDoH include:

- solriamfetol (Sunosi)
- pitolisant (Wakix) – also used to treat cataplexy

Stimulant medications are also an option. But they have an increased risk of becoming habit-forming. These include:

- modafinil (Provigil)
- armodafinil (Nuvigil)
- methylphenidate (Ritalin, Concerta, others)
- amphetamines (Adderall XR10, Dexedrine)

*Side effects of stimulants may include:


Insomnia


Anxiety


Nausea

Serotonin and norepinephrine reuptake inhibitors (SNRI) and selective serotonin reuptake inhibitors (SSRI):

This type of medication affects REM sleep by suppressing it. Doctors may recommend it off-label to reduce symptoms of cataplexy that can occur with narcolepsy. Different options of SNRI's and SSRI's are available and include:

- venlafaxine (Effexor XR)
- fluoxetine (Prozac)
- sertraline (Zoloft)

As with any type of medication, side effects are possible with both types of medications. *Side effects may include:

Insomnia

Weight gain

Digestive issues

Tricyclic antidepressants:

This class of drug is an older type of antidepressant, and they are also off-label. Doctors tend to not prescribe this drug as often as they did in the past because of the newer antidepressants. Examples of tricycle antidepressants include:

- imipramine (Tofranil)
- clomipramine (Anafranil)

Oxybate Therapy:

Low-sodium oxybate is FDA approved to treat symptoms of idiopathic hypersomnia, such as EDS, sleep inertia, and prolonged sleep duration.

Oxybates are taken at night to relieve daytime symptoms of EDS and cataplexy in narcolepsy

- Sodium Oxybate (Xyrem)
- Extended-release sodium oxybate (Lumryz)
- Low-sodium oxybate (Xywav)

*Side effects may include:

Headaches

Nausea

Enuresis

Medication tips:

As with all medications, it is vital to follow your prescription. Ask your doctor what you should do if you miss a dose.

Do not stop taking medication unless your doctor instructs you to do so. Some medications need to be tapered before abruptly stopping.

If you develop side effects, it is essential to talk with your doctor. Certain side effects may ease as your body adjusts to the medication. In other cases, your doctor may try a different medication if the side effects are too bothersome.

If you take other medications for another medical condition, ask your doctor how they may interact with the medications used to treat CDoH. Although your doctor should be able to access all your other medications, you want to ensure nothing is overlooked.

The cost of medications can vary widely. The cost depends on the drug, your insurance, and where you buy it. If you have trouble with medication costs, talk with your doctor. There may be low-cost prescription plans, or you may qualify for governmental assistance.

Lastly, research continues on treatments, including medications to reduce symptoms of CDoH. In the future, more treatment options may be available down the road.

*For each therapy listed please refer to individual drugs prescribing information for a complete list of side effects.

Comorbidities of CDoH

In some cases, a person with a central disorder of hypersomnolence may also have other coexisting conditions, known as comorbidities, which occur alongside the sleep disorder.

Good quality sleep is vital for overall health. When sleep is inadequate, it affects other symptoms in the body, which may increase the risk of developing other conditions.

Possible comorbidities of CDoH include:

Cardiovascular disease:

Certain diseases of hypersomnolence appear to increase the risk of developing cardiovascular disease. For instance, according to the American Heart Association, narcolepsy is associated with an increased risk of cardiovascular disease. This may occur because narcolepsy may lead to increased blood pressure at night and weight gain. It may also cause deficiencies in specific neurotransmitters, which increases the risk of high blood pressure and heart disease.

Various studies also indicate an increased risk of heart disease for other forms of central hypersomnolence. For example, a study in Sleep Med found women that who reported daytime sleepiness almost daily had an elevated risk of cardiovascular disease compared to those who rarely have daytime sleepiness.

Sleep disorders:

Disorders of hypersomnolence can occur alone or along with another sleep disorder. In fact, it is common for people with certain forms of hypersomnolence to also have sleep disorders, such as:

Obstructive sleep apnea (OSA): OSA occurs when the muscles of the upper airway, including the tongue, partially or fully collapse and block the flow of air into the lungs. This obstruction of airflow causes brief periods of apnea during sleep. Signs of OSA include snoring, gasping for air, and morning headaches. OSA can occur alone or with other sleep disorders, including central disorders of hypersomnolence.

Insomnia: Insomnia involves problems falling or staying asleep. It may occur for a short time or become chronic. People that have insomnia often have daytime sleepiness.

Mental Health Disorders

Mental health disorders are often associated with central disorders of hypersomnolence. For instance, research suggests that anxiety and mood disorders are frequent comorbidities of narcolepsy. A study in the peer-reviewed journal Medical Sciences found that up to 57 percent of people with narcolepsy reported having depression. Depression also appears to occur often in people with idiopathic hypersomnia.

The reason for the association between central disorders of hypersomnolence and mental health disorders is not entirely apparent. One theory is that people with mental health disorders and hypersomnia disorders may have shared pathophysiology.

Another possibility is that the chronic issues related to hypersomnia, including fatigue and daytime sleepiness, may cause depression and anxiety.

Neurological disorders:

The incidence of neurological disorders occurring in conjunction with central disorders of hypersomnolence is not always clear. That's because certain neurological conditions can also cause hypersomnolence, such as:

Parkinson's disease: Parkinson's disease is a disorder that involves the central nervous system. It affects movement and causes muscle tremors. It also often disrupts sleep and may lead to hypersomnolence.

Multiple sclerosis (MS): Multiple sclerosis occurs when the immune system attacks the myelin, which covers the nerves. This causes a disruption in communication between the body and the brain.

People with MS develop lesions in the brain. The brain lesions that occur with multiple sclerosis may contribute to the development of narcolepsy.

Metabolic disorders

People with a central disorder of hypersomnolence also develop metabolic disorders more often than the general public.

Studies show that people with narcolepsy tended to have a lower metabolic rate and be overweight compared to controls in the study. Having disrupted sleep often affects metabolism, which contributes to weight gain.

Also, some people with daytime sleepiness may have certain eating behaviors, such as snacking more and eating high-sugar foods. This type of eating pattern may also lead to weight gain.

Comorbidities due to insufficient sleep

Mood Changes

Blood Pressure

Weight Gain

Diabetes

Pain

Cardiovascular Disease

Daytime Sleepiness

Weaken Immune Function

Impact on Quality of Life*

Disrupted sleep can impact every aspect of a person's life. Central disorders of hypersomnolence, which cause excessive sleepiness, can lead to physical symptoms like fatigue and emotional challenges, both of which can significantly reduce quality of life. Below are some possible issues associated with hypersomnolence disorders and their potential impact on your life.

Relationships

Central disorders of hypersomnolence can impact relationships, both personal and professional, including:

01

Family:

Experiencing excess daytime sleepiness can interfere with family relationships. For instance, it may lead to missed family get-togethers, responsibilities, and time with children.

02

Friends:

Studies indicate that people with central disorders of hypersomnolence often do not participate in social activities due to fatigue and depression. This can affect friendships and the ability to make new friends.

03

Intimacy:

Sleep problems and cataplexy can affect all areas of a person's life, including intimacy. Being excessively tired also plays a role in mood, which directly impacts intimacy.

Work/Career

Possible symptoms of central disorders of hypersomnolence, such as brain fog, depression, and fatigue, can impact a person's work life and career. Various studies found employment was affected by the sleep disorder. For example, a study in the journal Sleep Medicine found that people with certain disorders of hypersomnolence reported a high degree of procrastination directly related to depression. Oftentimes, accommodations are required in the workplace, such as flexible working hours and a place to nap.

Similar research also found that people with hypersomnolence disorder had impairments in overall work productivity and missed a substantial amount of time from work because of their disorder.

In some cases, employers do not understand sleep disorders. The disorder is an invisible condition since outward symptoms are not recognized. This may also increase misunderstandings by employers.

Education

Fatigue, sleepiness, depression, and brain fog often directly impact learning. Participation in extra-curricular activities is often limited for students who are particularly impacted by excessive daytime sleepiness.

Memory might also become impaired making learning and retaining information more difficult.

Accommodations in school and college are often needed to provide an optimal learning environment for young people living with sleep disorders. Accommodations may include a late school start time, additional time for homework and exams, and a dedicated nap space.

Memory

Good quality of sleep is needed for memory to work optimally. Sleep is vital for the formation and consolidation of memories. Sleep disorders can adversely affect the memory consolidation process.

During different stages of sleep, memory storage happens. When quality sleep is affected, how the brain links memories together becomes impaired.

Attention

Research shows that there is a link between self-reported daytime sleepiness and attention problems in people with disorders of hypersomnolence. For example, a study in Sleep Medicine Reviews found that people with narcolepsy type 1 and 2, along with people with idiopathic hypersomnia, had consistent attention impairments.

It is not entirely clear why this occurs. It may be a combination of fatigue, memory issues, and physiological factors that affect the brain.

Brain Fog

Brain fog is not a medical term, but it is a phrase used to describe an overall clouding of consciousness and is common to hypersomnia disorders. It may include confusion, thinking slower than usual, and trouble concentrating. There are no measurable tests to determine the severity of brain fog, which is commonly associated with hypersomnia disorders. It is often described as feeling like one's head is wrapped in wool.

Cognitive deficits

Cognitive deficits are not always present with hypersomnolence disorders, but they can occur. For example, some individuals may experience impaired emotional processing and poor decision-making abilities.

Psychosocial self-esteem and stigma

Having a sleep disorder can lead to decreased self-esteem. The effects of hypersomnolence that may occur, such as depression, can also have psychosocial impacts. Mental health conditions and hypersomnolence disorders are not always well understood. This can lead to stigma, or the fear of being stigmatized if their condition becomes known. Attempting to manage the condition secretly can also lead to further complications.

Special Considerations

People living with Hypersomnolence disorders often face additional challenges navigating pregnancy and undergoing anesthesia. This is due to experiencing excessive sleepiness and possibly the interaction of medications. Given how rare Central Disorders of Hypersomnolence are, specialists outside of sleep medicine may not be familiar with the disorder or the unique challenges often experienced with pregnancy, parenting, and anesthesia. Driving is also another special consideration. It is important to advocate for yourself and seek support from caregivers and loved ones particularly when navigating additionally disruptive and challenging situations.

Anesthesia

When undergoing surgery, it is crucial for the surgical team to be aware of how prescribed treatments for Central Disorders of Hypersomnolence (CDoH) interact with sedative medications. Individuals with CDoH may experience unusual responses to waking up after surgery. For instance, those with idiopathic hypersomnia often face severe sleep inertia post-operatively, making regional anesthesia (nerve block) a preferred option when suitable. Additionally, hospital stays and surgeries can disrupt normal sleep patterns. Therefore, discussing your sleep schedule and prescribed medications with your anesthetist is strongly recommended.

Pregnancy

Women with hypersomnia disorders should consult their healthcare provider and OB-GYN before planning a pregnancy due to the potential risks posed by medications to the unborn child. Medication use can also negatively impact the delivery process and should be carefully considered if planning to breastfeed. Additionally, managing the nightly care of newborns and infants may be more challenging due to increased exhaustion. For those with cataplexy, heightened emotions can lead to more frequent attacks, requiring extra caution when caring for newborns. Support and education are available through pregnancy and parenting support groups, which partners are also encouraged to attend.

Driving

People with hypersomnia are technically allowed to drive, though laws vary by state. Due to the risk of drowsy driving and the possibility of falling asleep at the wheel, those with sleep disorders are more prone to accidents and near misses. It is crucial to drive only when fully alert.

Short trips after scheduled naps are advisable, and routes should be planned with frequent breaks. If you start feeling sleepy while driving, it's important to pull over to a safe location, take a nap in the car in a safe place, and only resume driving when you feel completely awake

Questions to Ask Your Doctor

Whether you have symptoms of a central disorder of hypersomnolence or have already been diagnosed with one, you might have questions. Learning as much as possible about your disorder and how to manage it is essential. In addition to medical treatment, you may be able to help improve your sleep through lifestyle changes.

Keep in mind everyone's situation is different. Often, management of central disorders of hypersomnolence may vary. A one-size-fits-all approach does not always work. Individual questions may vary. But some typical questions to ask your doctor include the following:

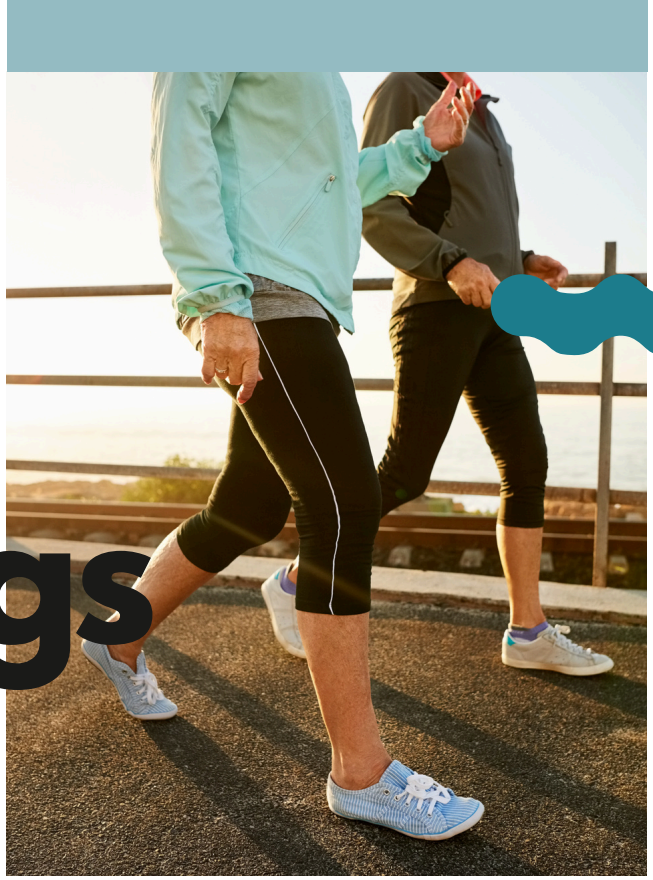
- Are all central disorders of hypersomnolence the same?
- Do I need a sleep study?
- What type of sleep study should I have?
- How do you tell the difference between central disorders of hypersomnolence?
- Is my diagnosis long-lasting?
- What is the recommended treatment?
- Are there side effects to medication?
- When can I expect symptoms to ease after treatment?
- Are there alternative treatments?
- I have other medical conditions. How can I effectively manage both conditions together?
- What are the risks if I do not get treatment?
- Are there lifestyle changes I can make that may help with symptoms?
- Is my disorder genetic?

Additional Tips when working with your doctor

There are other factors to consider when you are dealing with your doctor and medical team. Consider some of the following suggestions:

- Remember, you are also part of your treatment team. Make sure to be an advocate for your own care.
- Ask if you can bring someone with you to appointments. This provides another set of ears to gather information.
- Consider writing down some questions before your appointment so you will remember what you want to ask.
- Never be afraid to ask questions. If there is something you don't understand, ask.
- If you are newly diagnosed with a central disorder of hypersomnolence, ask about educational resources available to learn more.
- It is perfectly acceptable to ask for a second opinion if you want to determine if there are other treatment approaches that might work better for you.
- Don't let financial concerns stop you from getting the help you need. If needed, ask about financial options and help for treatment.
- Ask about how often you should see your doctor for a follow-up appointment. Treatment may need adjustments, and your needs may change. Ongoing appointments are vital.

Key Findings



Below are some key points to consider.

Quality sleep plays a vital role in overall well-being. Getting proper sleep may help rid the brain of certain toxins. The body also repairs itself during sleep. Lack of sleep can adversely affect the immune system, heart, and brain. Lack of sleep can also affect weight, mood, and memory.

Diagnostic tests help rule out certain disorders, which may cause daytime sleepiness such as obstructive sleep apnea. In some cases, a combination of different diagnostic tests may be needed to confirm a diagnosis. Tests may include, polysomnography, Multiple Sleep Latency Test, Maintenance of Wakefulness Test, and actigraphy. A sleep diary can also be helpful to determine factors that may affect sleep.

Doctors divide CDoH into different types. Each type may have somewhat varied symptoms and associated characteristics, particularly excessive daytime sleepiness. Types of CDoH include narcolepsy type 1, narcolepsy type 2, idiopathic hypersomnia, and Kleine-Levin syndrome.

Seeing a board-certified sleep specialist is vital to get an accurate diagnosis of a sleep disorder to start treatment.

Inadequate sleep may affect other organs and systems in the body. It also increases the risk of other conditions. Common comorbidities of CDoH include cardiovascular disease, other sleep disorders, such as sleep apnea, and mental health issues such as depression and anxiety.

Disrupted sleep and central disorder of hypersomnolence can have a significant impact on a person's quality of life. It can affect all areas of a person's life, including work, school, and relationships. It can also negatively affect self-esteem.

Idiopathic hypersomnia is one type of central disorder of hypersomnolence. It is a long-term neurologic condition that involves an insatiable need to sleep. But the specific cause of hypersomnia is not known.

Kleine-Levin syndrome is considered a rare disorder that causes an excessive need for sleep along with other behavior-related symptoms. Symptoms appear to come in cycles and may last for weeks or months. But symptoms may also resolve and come back in the future.

Narcolepsy is a neurological disorder affecting a person's ability to control their sleep/wake cycle. A person with narcolepsy may have excessive daytime sleepiness and uncontrolled, sudden episodes of sleep.

Doctors divide narcolepsy into two subtypes, including type 1 and type 2.

Type 1 narcolepsy includes having cataplexy. Cataplexy involves the brief loss of muscle tone while a person is still awake. It is triggered by emotions, such as laughter or fear.

People with type 2 narcolepsy do not have cataplexy. Type 2 symptoms also tend to be milder than in type 1.

Currently, there is no cure for central disorders of hypersomnolence (CDoH). However, treatment may help ease symptoms, which improves quality of life.

Treatment may include strategies to improve sleep quality, such as relaxing before bed, creating an environment to promote sleep, and keeping to a set wake/sleep cycle.

Different classifications of medications are an option, including certain wake-promoting agents, stimulants, antidepressants, and oxybate therapy. As with all medications, it is vital to follow your prescription.

Once diagnosed someone with a CDoH should work with their healthcare provider to follow their treatment plan and discuss any side effects. Seeking social support is also recommended.

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