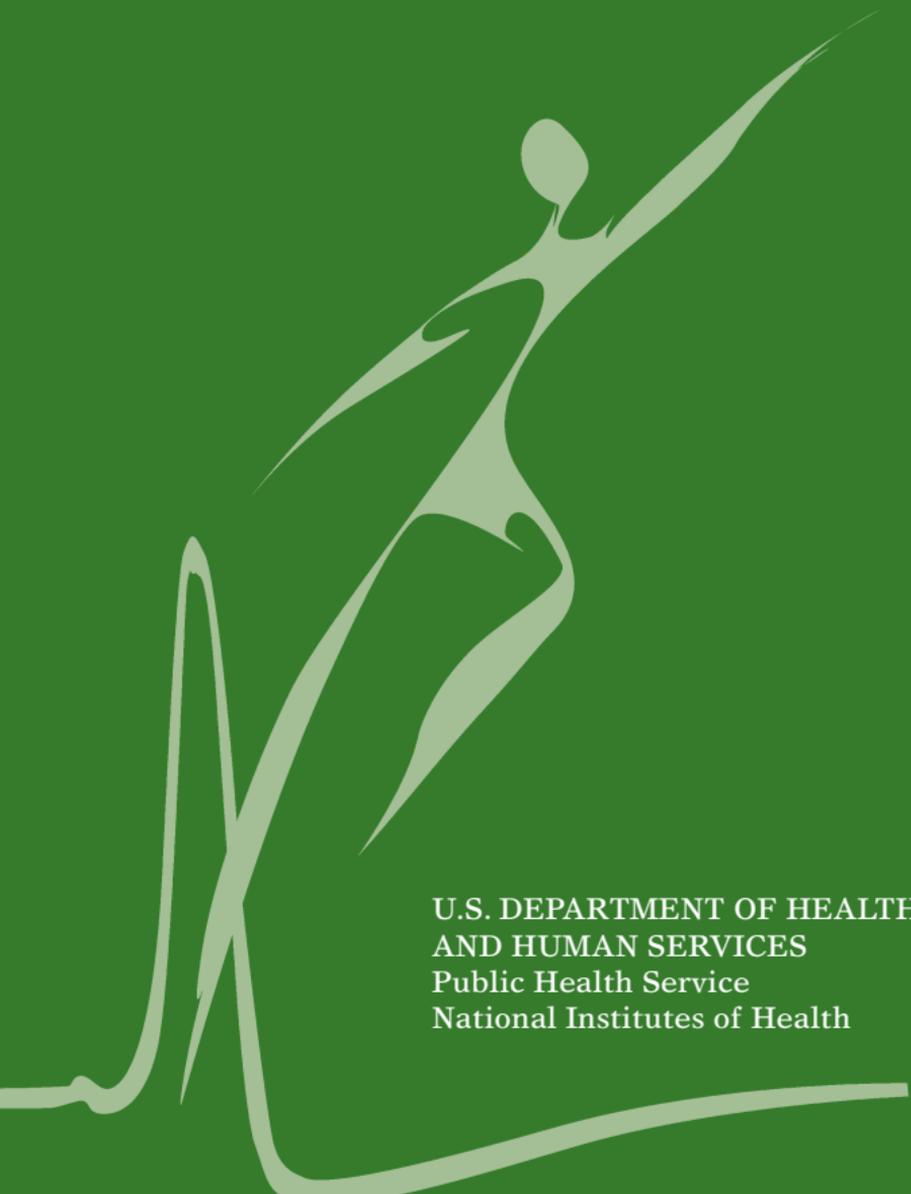


Restless Legs Syndrome

A stylized, light green graphic of a person with their arms raised in a 'V' shape, set against a dark green background. Below the figure is a white pulse line that starts on the left, rises to a peak, dips, and then rises again towards the right. The overall design is minimalist and modern.

U.S. DEPARTMENT OF HEALTH
AND HUMAN SERVICES
Public Health Service
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Restless Legs Syndrome

What is restless legs syndrome?

Restless legs syndrome (RLS) is a neurological disorder characterized by throbbing, pulling, creeping, or other unpleasant sensations in the legs and an uncontrollable, and sometimes overwhelming, urge to move them. Symptoms occur primarily at night when a person is relaxing or at rest and can increase in severity during the night. Moving the legs relieves the discomfort. Often called paresthesias (abnormal sensations) or dysesthesias (unpleasant abnormal sensations), the sensations range in severity from uncomfortable to irritating to painful.

The most distinctive or unusual aspect of the condition is that lying down and trying to relax activates the symptoms. Most people with RLS have difficulty falling asleep and staying asleep. Left untreated, the condition causes exhaustion and daytime fatigue. Many people with RLS report that their job, personal relations, and activities of daily living are strongly affected as a result of their sleep deprivation. They are often unable to concentrate, have impaired memory, or fail to accomplish daily tasks. It also can make traveling difficult and can cause depression.

As many as 10 percent of the U.S. population may have RLS. Several studies have shown

that moderate to severe RLS affects approximately 2 to 3 percent of adults (more than 5 million individuals). An additional 5 percent appears to be affected by a milder form.

Childhood RLS is estimated to affect almost 1 million school-age children, with one-third having moderate to severe symptoms. Some people with RLS will not seek medical attention, believing that they will not be taken seriously, that their symptoms are too mild, or that their condition is not treatable. Some physicians wrongly attribute the symptoms to nervousness, insomnia, stress, arthritis, muscle cramps, or aging.

RLS occurs in both men and women, although the incidence is about twice as high in women. It may begin at any age. Many individuals who are severely affected are middle-aged or older, and the symptoms typically become more frequent and last longer with age.

RLS is classified as a movement disorder, as individuals are forced to move their legs in order to gain relief from symptoms.

More than 80 percent of people with RLS also experience a more common condition known as periodic limb movement of sleep (PLMS). PLMS is characterized by involuntary leg twitching or jerking movements during sleep that typically occur every 15 to 40 seconds, sometimes throughout the night. The symptoms cause repeated awakening and severely disrupted sleep. Although many individuals with RLS also develop PLMS, most people with PLMS do not experience RLS. People

who have PLMS and do not have RLS or another cause for the PLMS may be diagnosed with periodic limb movement disorder (PLMD). PLMD may be a variant of RLS and thus respond to similar treatments.

What are common signs and symptoms of restless legs?

People with RLS feel uncomfortable sensations in their legs, especially when sitting or lying down, accompanied by an irresistible urge to move the affected limb. These sensations less commonly affect the arms, trunk, or head. Although the sensations can occur on just one side of the body, they most often affect both sides.

Because moving the legs (or other affected parts of the body) relieves the discomfort, people with RLS often keep their legs in motion to minimize or prevent the sensations. They may pace the floor, constantly move their legs while sitting, and toss and turn in bed.

A classic feature of RLS is that the symptoms are worse at night with a distinct symptom-free period in the early morning, allowing for more refreshing sleep at that time. Other triggering situations are periods of inactivity such as long car trips, sitting in a movie theater, long-distance flights, immobilization in a cast, or relaxation exercises. Many individuals also note a worsening of symptoms if their sleep is further reduced by events or activity.

RLS symptoms may vary from day to day and in severity and frequency from person to

person. Individuals with mild RLS may have some disruption of sleep onset and minor interference in daytime activities. In moderately severe cases, symptoms occur only once or twice a week but result in significant delay of sleep onset, with some disruption of daytime function. In severe cases of RLS, the symptoms occur more than twice a week and result in burdensome interruption of sleep and impairment of daytime function.

Individuals with RLS can sometimes experience remissions—spontaneous improvement over a period of weeks or months before symptoms reappear—usually during the early stages of the disorder. In general, however, symptoms become more severe over time.

People who have both RLS and an associated medical condition tend to develop more severe symptoms rapidly. In contrast, those who have RLS that is not related to any other condition and experience onset at an early age show a very slow progression of the disorder; many years may pass before symptoms occur regularly.

What causes restless legs syndrome?

In most cases, the cause of RLS is unknown. However, it may have a genetic component; RLS is often found in families where the onset of symptoms is before age 40. Specific gene variants have been associated with RLS. Evidence indicates that low levels of iron in the brain also may be responsible for RLS.

Considerable evidence suggests that RLS is related to a dysfunction in the brain's basal

ganglia circuits that use the neurotransmitter dopamine, which is needed to produce smooth, purposeful muscle activity and movement. Disruption of these pathways frequently results in involuntary movements. Individuals with Parkinson's disease, another disorder of the basal ganglia's dopamine pathways, often have RLS as well.

RLS also appears to be related to the following factors or conditions, although researchers do not yet know if these factors actually cause RLS:

- Chronic diseases such as kidney failure, diabetes, and peripheral neuropathy. Treating the underlying condition often provides relief from RLS symptoms.
- Certain medications that may aggravate symptoms. These medications include anti-nausea drugs (prochlorperazine or metoclopramide), antipsychotic drugs (haloperidol or phenothiazine derivatives), antidepressants that increase serotonin, and some cold and allergy medications that contain sedating antihistamines.
- Pregnancy, especially in the last trimester. In most cases, symptoms usually disappear within 4 weeks after delivery.

Alcohol and sleep deprivation also may aggravate or trigger symptoms in some individuals. Reducing or completely eliminating these factors may relieve symptoms, but it is unclear if this can prevent RLS symptoms from occurring at all.

How is restless legs syndrome diagnosed?

There is no specific test for RLS. The four basic criteria for diagnosing the disorder are:

- Symptoms that are worse at night and are absent or negligible in the morning;
- A strong and often overwhelming need or urge to move the affected limb(s), often associated with paresthesias or dysesthesias;
- Sensory symptoms that are triggered by rest, relaxation, or sleep; and
- Sensory symptoms that are relieved with movement and the relief persists as long as the movement continues.

Physicians should focus largely on the individual's descriptions of symptoms, their triggers and relieving factors, as well as the presence or absence of symptoms throughout the day. A neurological and physical exam, plus information from the individual's medical and family history and list of current medications, may be helpful. Individuals may be asked about frequency, duration, and intensity of symptoms as well as their tendency toward daytime sleep patterns and sleepiness, disturbance of sleep, or daytime function.

Laboratory tests may be performed to rule out other conditions. Blood tests can identify iron and vitamin deficiencies as well as other medical disorders associated with RLS. In some cases, sleep studies such as polysomnography (a test that records the individual's brain waves, heartbeat, breathing, and leg

movements during an entire night) may identify the presence of other causes of sleep disruption (e.g., sleep apnea), which may impact management of the disorder.

Diagnosing RLS in children may be especially difficult, since it may be hard for a child to describe where it hurts, when and how often the symptoms occur, and how long symptoms last. Pediatric RLS can sometimes be misdiagnosed as “growing pains” or attention deficit disorder.

How is restless legs syndrome treated?

RLS can be treated, with care directed toward relieving symptoms. Moving the affected limb(s) may provide temporary relief. Sometimes RLS symptoms can be controlled by finding and treating an associated medical condition, such as peripheral neuropathy or diabetes.

Certain lifestyle changes and activities that may reduce symptoms in persons with mild to moderate symptoms include decreased use of caffeine, alcohol, and tobacco; supplements to correct deficiencies in iron, folate, and magnesium; changing or maintaining a regular sleep pattern; a program of moderate exercise; and massaging the legs, taking a hot bath, or using a heating pad or ice pack. A trial of iron supplements is recommended only for individuals with low iron levels. Although many people find some relief with such measures, rarely do these efforts completely eliminate symptoms.

Medications are usually helpful but no single medication effectively manages RLS for all individuals. Trials of different drugs may be necessary. In addition, medications taken regularly may lose their effect over time, making it necessary to change medications periodically.

Common drugs prescribed to treat RLS include:

Dopaminergic agents (drugs that increase dopamine), largely used to treat Parkinson's disease, have been shown to reduce symptoms of RLS and PLMS when they are taken at bedtime and are considered the initial treatment of choice. The U.S. Food and Drug Administration has approved pramipexole and ropinirole to treat moderate to severe RLS. Both drugs are generally well tolerated but can cause nausea, dizziness, or other side effects. Good short-term results of treatment with levodopa plus carbidopa have been reported.

Although dopamine-related medications are effective in managing RLS, long-term use can lead to worsening of the symptoms in many individuals. This apparent progressive worsening is referred to as "augmentation." With chronic use, a person may begin to experience symptoms earlier in the evening than in the afternoon until finally the symptoms are present around the clock. The initial evening or bedtime dose becomes less effective, the symptoms at night become more intense, and symptoms begin to affect the arms or trunk. Fortunately, this apparent progression is reversible by removing the person from

all dopamine-related medications. Another important adverse effect of dopamine medications that occurs in some people is the development of impulsive or obsessive behaviors such as obsessive gambling or shopping. Should they occur, these behaviors can be reversed by stopping the medication.

Other medications may be prescribed “off-label” (not specifically designed to treat RLS) to relieve some of the symptoms of the disorder.

Benzodiazepines can help individuals who have mild or intermittent symptoms obtain a more restful sleep. However, even if taken only at bedtime they can sometimes cause daytime sleepiness. Benzodiazepines such as clonazepam and diazepam are generally prescribed to treat anxiety, muscle spasms, and insomnia. Because these drugs also may induce or aggravate sleep apnea in some cases, they should not be used in people with this condition.

Opioids such as codeine, propoxyphene, or oxycodone may be prescribed at night to diminish pain and help to relax individuals with more severe symptoms. Side effects include dizziness, nausea, exacerbation of sleep apnea, and the risk of addiction.

Anticonvulsants such as gabapentin and pregabalin can decrease the sensory disturbances such as creeping and crawling sensations and nerve pain. Dizziness, fatigue, and sleepiness are among the possible side effects.

What is the prognosis of people with restless legs?

RLS is generally a lifelong condition for which there is no cure. Nevertheless, current therapies can control the disorder, minimizing symptoms and increasing periods of restful sleep. Symptoms may gradually worsen with age, although the decline may be somewhat faster for individuals who also suffer from an associated medical condition. In addition, some individuals have remissions—periods in which symptoms decrease or disappear for days, weeks, or months—although symptoms usually eventually reappear. A diagnosis of RLS does not indicate the onset of another neurological disease, such as Parkinson’s disease.

What research is being done?

The National Institute of Neurological Disorders and Stroke (NINDS), a component of the National Institutes of Health, is the primary Federal sponsor of research on brain and nervous system disorders. The NINDS seeks to increase scientific understanding of RLS, find improved methods of diagnosing and treating the syndrome, and discover ways to prevent it.

NINDS-supported researchers are investigating the possible role of dopamine function in RLS. Researchers suspect that impaired transmission of dopamine signals may play a role in the disorder. Additional research should provide new information about how RLS occurs and may help investigators identify more successful treatment options.

Workshops and conferences sponsored by the NINDS as well as nongovernment organizations have emphasized the need for further research on animal models and the complex roles of dopamine interaction with iron levels. For example, serum ferritin, an index of iron deficiency, has been shown to predict the severity of RLS symptoms in older individuals.

In other related research, NINDS scientists are conducting studies to better understand the physiological mechanisms of PLMS associated with RLS.

Where can I get more information?

For more information on neurological disorders or research programs funded by the NINDS, contact the Institute's Brain Resources and Information Network (BRAIN) at:

BRAIN

P.O. Box 5801
Bethesda, MD 20824
301-496-5751
800-352-9424
www.ninds.nih.gov

Information also is available from the following organizations:

Willis-Ekbom Disease Foundation

530 Greenview Drive SW, Suite 210
Rochester, MN 55902
507-287-6465
www.rls.org

National Sleep Foundation

1522 K Street, NW, Suite 500

Washington, DC 20005

202-347-3471

www.sleepfoundation.org

**National Organization for Rare Disorders
(NORD)**

P.O. Box 1968

55 Kenosia Avenue

Danbury, CT 06813-1968

203-744-0100

800-999-6673

www.rarediseases.org

National Heart, Lung, and Blood Institute

Health Information Center

National Institutes of Health

P.O. Box 30105

Bethesda, MD 20824-0105

301-592-8573

www.nhlbi.nih.gov



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