



Restless Legs Syndrome

U.S. DEPARTMENT OF HEALTH
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What is restless legs syndrome?

Restless legs syndrome (RLS), also called Willis-Ekbom Disease, is a neurological disorder that causes unpleasant or uncomfortable sensations in your legs and an irresistible urge to move them. Symptoms commonly occur in the late afternoon or evening hours and are often most intense at night when you are resting. RLS can severely disrupt your sleep, making it difficult to fall asleep or return to sleep after waking up. Moving the legs or walking typically relieves the discomfort but the sensations often recur once the movement stops.

RLS is both a sleep disorder, since the symptoms are triggered by resting and attempting to sleep, and a movement disorder, since people are forced to move their legs in order to relieve symptoms. It is generally a lifelong condition for which there is no cure. However, treatments are available to ease symptoms.

Who is at risk?

It is estimated that up to 7-10 percent of the U.S. population may have RLS, which can begin at any age. It occurs in both men and women, although women are more likely to have it than men. Many individuals who are severely affected are middle-aged or older, and the symptoms typically become more frequent and last longer with age.

What are common signs and symptoms of restless legs?

If you have RLS, you may feel an irresistible urge to move, which is accompanied by uncomfortable sensations in your lower limbs that are unlike normal sensations experienced by someone without the disorder. The sensations in your legs may feel like aching, throbbing, pulling, itching, crawling, or creeping. These sensations less commonly affect the arms, and rarely the chest or head. Although the sensations can occur on just one side of your body, they most often affect both sides.

Common characteristics of RLS include:

- **Sensations that begin after rest.** They typically occur when you are inactive and sitting for extended periods (for example, when taking a trip by plane or watching a movie).
- **Relief of discomfort with movement.** You may need to keep your legs (or other affected parts of the body) in motion to minimize or prevent the sensations. You might need to pace the floor or constantly move your legs while sitting.

- **Worsening of symptoms at night** with a distinct symptom-free period in the early morning. You might have difficulty falling asleep and staying asleep. You may also note a worsening of symptoms if your sleep is further reduced by events or activity.

RLS symptoms may vary from day to day, in severity and frequency, and from person to person. If you have moderately severe RLS, your symptoms might occur only once or twice a week but often 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.

RLS can cause you to have:

- Changes in mood
- Exhaustion and daytime sleepiness
- Problems concentrating
- Impaired memory
- Decreased productivity
- Depression and anxiety

You sometimes might experience remissions—periods in which your symptoms decrease or disappear for weeks or months—usually during the early stages of the disorder. In general, however, symptoms often reappear and become more severe over time.

What is periodic limb movement of sleep? Is it different from RLS?

More than 80 percent of people with RLS also experience periodic limb movement of sleep (PLMS). PLMS is characterized by involuntary leg (and sometimes arm) twitching or jerking movements during sleep that typically occur every 15 to 40 seconds, sometimes throughout the night. Although many individuals with RLS also develop PLMS, most people with PLMS do not experience RLS.

What causes restless legs syndrome?

In most cases, the cause of RLS is unknown. However, RLS often runs in families and specific gene variants have been associated with the condition. Low levels of iron in the brain also may be responsible for RLS.

RLS also may be related to a dysfunction in a part of your brain that controls movement (called the basal ganglia). The basal ganglia use the brain chemical dopamine to produce smooth, purposeful muscle activity and movement. Disruption of dopamine pathways (or connections between nerve cells) frequently results in involuntary movements. Individuals with Parkinson's disease—another disorder of the basal ganglia's dopamine pathways—have increased risk of developing RLS.

RLS also appears to be related to or accompany the following factors or underlying conditions:

- End-stage renal disease and hemodialysis
- Neuropathy (nerve damage)

- Sleep deprivation and other sleep conditions such as sleep apnea
- Pregnancy or hormonal changes, especially in the last trimester. In most cases, symptoms usually disappear within 4 weeks after delivery.
- Use of alcohol, nicotine, and caffeine

Certain medications may aggravate your RLS symptoms, such as some antinausea drugs, antipsychotic drugs, antidepressants that increase serotonin, and cold and allergy medications that contain older antihistamines.

How is restless legs syndrome diagnosed and treated?

Diagnosis

Since there is no specific test for RLS, the condition is diagnosed by a doctor's evaluation. The five basic criteria for clinically diagnosing RLS are:

- A strong and often overwhelming need or urge to move your legs that is often associated with abnormal, unpleasant, or uncomfortable sensations
- The urge to move your legs starts or get worse during rest or inactivity
- The urge to move your legs is at least temporarily and partially or totally relieved by movements
- The urge to move your legs starts or is aggravated in the evening or night
- The above four features are not due to any other medical or behavioral condition

A neurological and physical exam, plus information about your medical and family history and list of current medications, may be helpful. You should talk with your doctor about:

- The frequency, duration, and intensity of your symptoms
- Any movement that helps to relieve symptoms
- How much time it takes to fall asleep
- Any pain related to symptoms
- Any tendency toward daytime sleep patterns and sleepiness, disturbance of sleep, or daytime function

Laboratory tests such as blood tests may rule out other conditions that may be causing your RLS symptoms, such as kidney failure, low iron levels, and other causes of sleep disruption (such as sleep apnea), and pregnancy (some 25 percent of pregnant women develop RLS but the symptoms often disappear after giving birth).

Diagnosing RLS in children may be especially difficult since it may be hard for children to describe symptoms. Pediatric RLS can sometimes be misdiagnosed as “growing pains” or attention deficit disorder.

Treatment

There is no cure for RLS, but some symptoms can be treated. Moving your affected limb(s) may provide temporary relief. Sometimes RLS symptoms can be controlled by treating an associated medical condition, such as peripheral neuropathy, diabetes, or iron deficiency anemia.

Medications for RLS include:

- **Iron supplements.** Treating iron deficiency can dramatically improve, if not eliminate, RLS.
- **Anti-seizure drugs.** Anti-seizure drugs are becoming the first-line prescription drugs for those with RLS. The U.S. Food and Drug Administration has approved gabapentin enacarbil for the treatment of moderate to severe RLS. Other anti-seizure drugs such as gabapentin and pregabalin can decrease such sensory disturbances and nerve pain.
- **Dopaminergic agents.** These drugs, which increase dopamine in the brain, can reduce symptoms of RLS when taken at nighttime. The medications ropinirole, pramipexole, and rotigotine have been approved to treat moderate to severe RLS. Levodopa plus carbidopa may be effective when used intermittently, but not daily. Long-term use of dopaminergic drugs can eventually worsen symptoms and cause other complications.
- **Opioids.** Drugs such as methadone, codeine, hydrocodone, or oxycodone are sometimes prescribed to treat individuals with more severe symptoms of RLS who do not respond well to other medications.
- **Benzodiazepines.** Medications such as clonazepam and lorazepam are generally prescribed to treat anxiety, muscle spasms, and insomnia, and can help individuals get more restful sleep.

Certain lifestyle changes and activities

may provide some relief if you have mild to moderate RLS:

- Avoid or decrease the use of alcohol, nicotine, and caffeine
- Change or maintain a regular sleep pattern
- Moderate, regular exercise
- Massage the legs or take a warm bath
- Apply a heating pad or ice pack
- Foot wraps specially designed for people with RLS, or vibration pads to the back of the legs
- Aerobic and leg-stretching exercises of moderate intensity

What are the latest updates?

The National Institute of Neurological Disorders and Stroke (NINDS) is the primary federal funding agency for research on restless legs syndrome. NINDS is a component of the National Institutes of Health (NIH), the leading supporter of biomedical research in the world.

Researchers are investigating changes in the brain's signaling pathways that are likely to contribute to RLS. In particular, researchers suspect that impaired transmission of dopamine in the brain's basal ganglia may play a role. Researchers also hope to discover genetic relationships in RLS and to better understand what causes the disease.

NINDS-funded researchers are also studying the role of epigenetics in RLS development.

Epigenetic changes can switch genes on or off, which can broadly impact both health and disease. Evidence suggests that iron deficiency during pregnancy, in infancy, and childhood increases the risk of developing RLS later in life. Scientists hope that understanding epigenetic changes associated with iron deficiency can offer new information on how to prevent RLS.

NINDS also supports research on why the use of dopamine agents to treat RLS, Parkinson's disease, and other movement disorders can lead to impulse control disorders, with aims to develop new or improved treatments that avoid this adverse effect.

NINDS-funded researchers are using advanced magnetic resonance imaging (MRI) to measure brain chemical changes in the brain's arousal system in individuals with RLS to develop new research models and ways to correct the overactive arousal process.

Scientists currently don't fully understand the mechanisms by which iron gets into the brain and how those mechanisms are regulated. NINDS-funded researchers are studying the role of endothelial cells—part of the protective lining called the blood-brain barrier that separates circulating blood from the fluid surrounding brain tissue—in the regulation of cerebral iron metabolism. Results may offer new insights to treating the cognitive and movement symptoms associated with RLS.

Researchers are also testing non-drug therapies such as a compact, wearable non-invasive nerve stimulation device designed to treat RLS during sleep.

More information about research on RLS supported by NINDS or other components of the NIH is available through the NIH RePORTER (<https://reporter.nih.gov>), a searchable database of current and previously funded research, as well as research results such as publications.

What can I do?

Call Your Doctor

If you are concerned about sleep problems and RLS, call your doctor. If you or someone you know has recently been diagnosed, contact the organizations referenced below to find out more about care, support, and research. It is important to educate family, friends, and caregivers about your or a loved one's diagnosis. In-person and online support groups offered by nonprofit organizations can give you, families, and caregivers additional resources and opportunities to share experiences and learn about strategies for care and support.

Participate in a Clinical Trial or Study

Clinical studies offer an opportunity to help researchers find better ways to safely detect, treat, or prevent RLS. All types of volunteers are needed—people with RLS, at-risk individuals, and healthy volunteers—of all different ages, sexes, races, and ethnicities to ensure that study results apply to as many people as possible, and that treatments will be safe and effective for everyone who will

use them. For information about how you can contribute to the goal of finding a treatment or cure for RLS, visit the webpage “NIH Clinical Research Trials and You” at www.nih.gov/health/clinicaltrials. To search for trials and studies, go to www.clinicaltrials.gov.

Where can I find more information?

Information about RLS is available from the following organizations:

Restless Legs Syndrome Foundation

Email: info@rls.org

Phone: 512-366-9109

<https://www.rls.org>

National Organization for Rare Disorders (NORD)

Email: rarediseases.org/contact-us/

Phone: 203-744-0100,
voice mail 800-999-6673

<https://rarediseases.org>

National Sleep Foundation

Email: nsf@thensf.org

Phone: 703-243-1697

<https://sleepfoundation.org/>

American Sleep Association

Email: contactASA@sleepassociation.org

<https://www.sleepassociation.org/>

National Heart, Lung, and Blood Institute (NHLBI)

Phone: 877-645-2448

<https://www.nhlbi.nih.gov/>

**You may be interested in the following
NINDS publication:**

Understanding Sleep: Information about sleep and what happens to the brain during sleep.

[https://www.ninds.nih.gov/Disorders/](https://www.ninds.nih.gov/Disorders/Patient-Caregiver-Education/Understanding-Sleep)

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