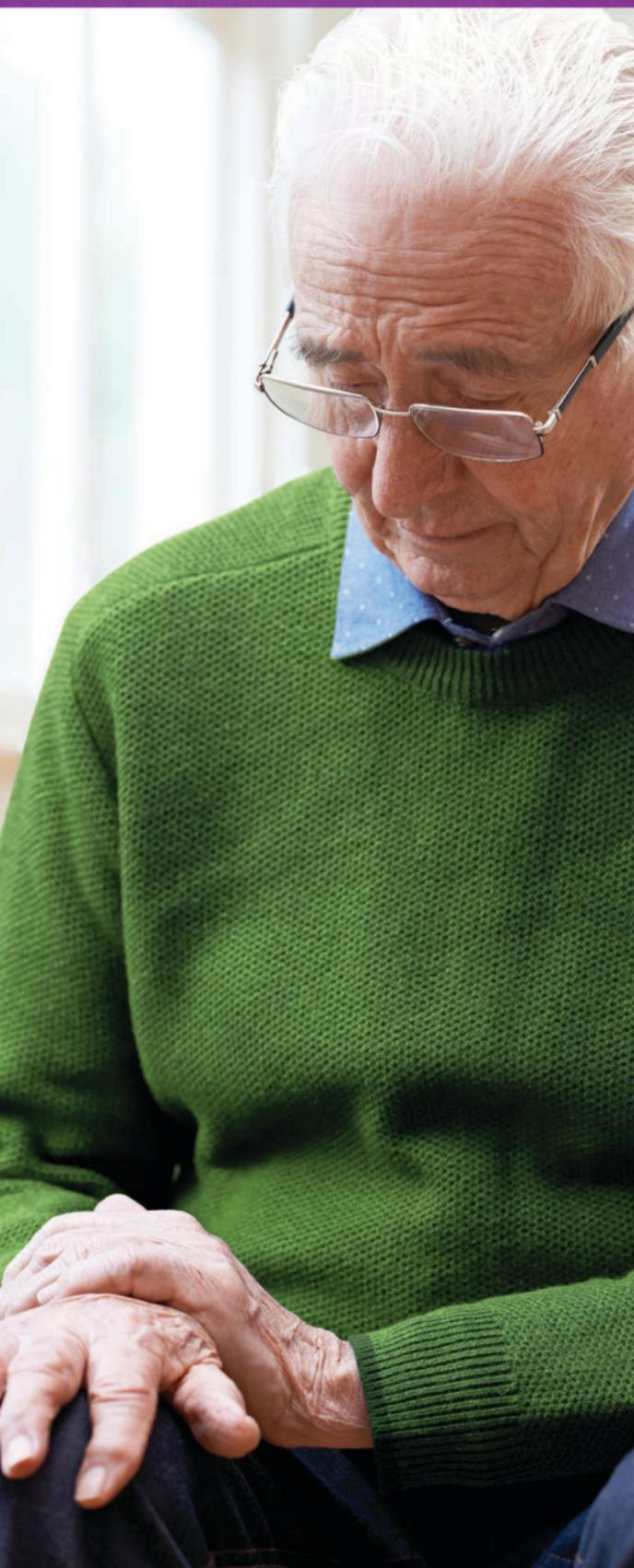




National Institute of
Neurological Disorders
and Stroke

Tremor



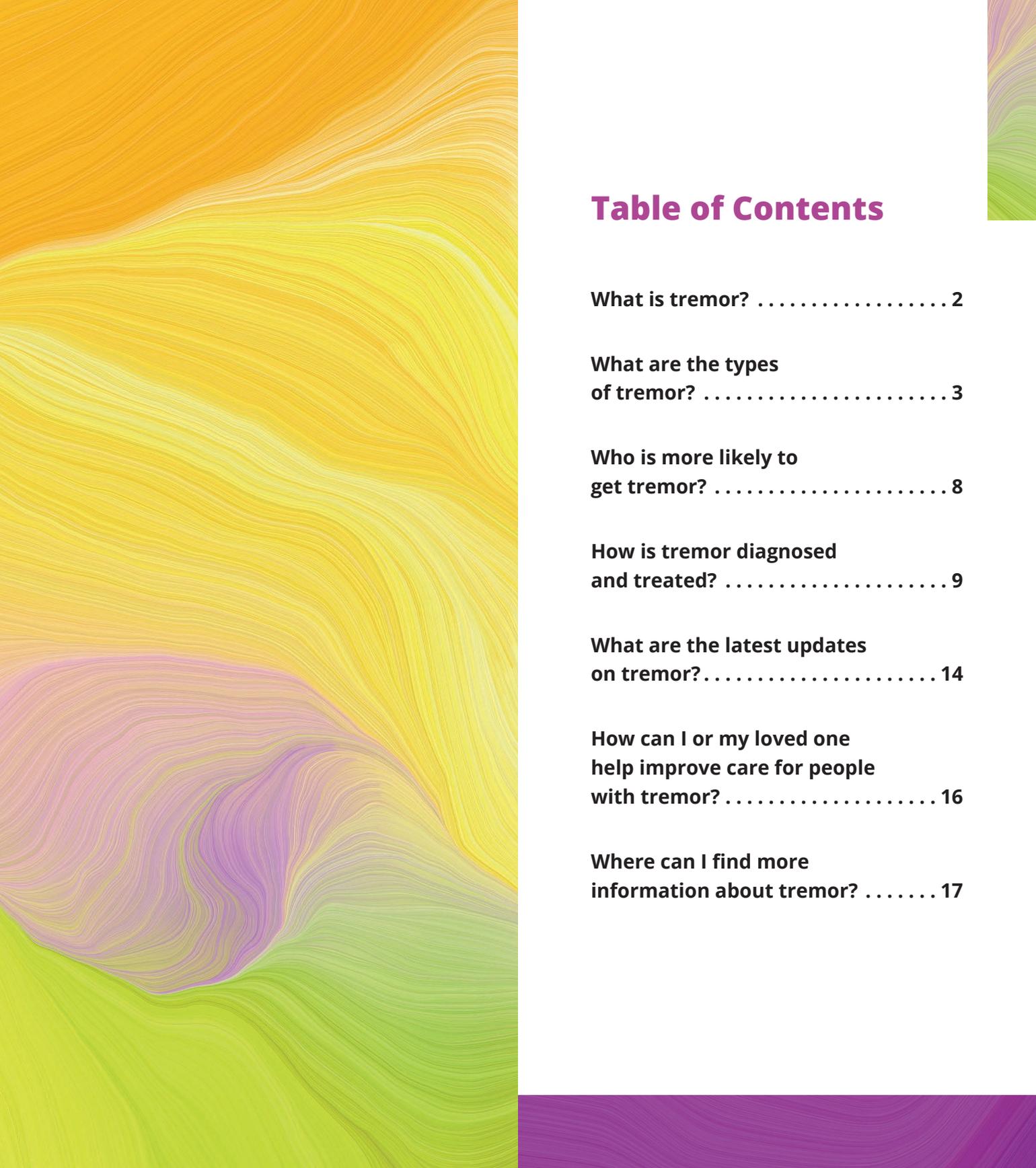


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What is tremor?

Tremor is a neurological condition that includes shaking or trembling movements in one or more parts of the body, most commonly affecting a person's hands. It can also occur in the arms, legs, head, vocal cords, and torso. The tremor may be constant, or only happen sometimes. Tremor can occur on its own or as a result of another disorder.

Tremor is not life threatening, but it may cause challenges and even lead to disabilities. Tremor can make daily life tasks such as writing, typing, eating, shaving, and dressing more difficult.

Common symptoms may include:

- Rhythmic shaking of the hands, arms, head, legs, or torso
- Shaky voice
- Difficulty with writing or drawing
- Problems holding and controlling utensils, tools, or other items
- Some tremor can be triggered by stress or strong emotion, being physically tired, or being in certain postures or making specific movements.

What are the types of tremor?

Tremor is categorized based on when and how the tremor is activated. These categories are rest and action tremor. **Rest tremor** occurs when people are at rest. People with Parkinson's disease often experience rest tremor. **Action tremor** occurs when a muscle is moved voluntarily. There are several sub-classifications of action tremor, many of which overlap.

- **Postural tremor** occurs when holding a position against gravity, such as holding the arms outstretched.
- **Kinetic tremor** is associated with any voluntary movement, such as moving the wrists up and down or closing and opening your eyes.
 - **Intention tremor** starts when the person makes an intended movement toward a target, such as lifting a finger to touch their nose.
 - **Task-specific tremor** only appears when performing goal-oriented tasks such as handwriting or speaking.
- **Isometric tremor** occurs during a voluntary muscle contraction that is not accompanied by any movement, such as when holding a heavy book in the same position.

Tremor syndromes are defined based on the pattern of the tremor.

Some of the most common forms include:

Essential tremor

Essential tremor (previously also called benign essential tremor or familial tremor) is one of the most common movement disorders. Its key feature is a tremor in both hands and arms during action without other neurological signs. It also may affect a person's head, voice, or lower limbs. Although the tremor can start at any age, it most often first appears during adolescence or in middle age (between ages 40 and 50). It can be mild and stay mild, or slowly get worse over time.

The exact cause of essential tremor is unknown. Studies show essential tremor is accompanied by a mild degeneration of the cerebellum, which is the part of your brain that controls movement coordination. Essential tremor is an inherited condition in 50-70% of cases (referred to as familial tremor). Familial forms often appear early in life.

Dystonic tremor

Dystonic tremor occurs in people who are affected by dystonia—a movement disorder in which incorrect messages from the brain cause muscles to be overactive, resulting in abnormal postures or sustained, unwanted movements. The disorder usually appears in young or middle-aged adults and can affect any muscle in the body, but most commonly affects the neck (cervical dystonia), vocal cords (laryngeal dystonia), or arms/legs (limb dystonia). A person with dystonic tremor can sometimes relieve their tremor by relaxing completely or touching the affected body part or muscle.

Cerebellar tremor

Cerebellar tremor is typically a slow, big (high amplitude) tremor of the arms, legs, hands, or feet that worsens at the end of a purposeful movement such as pressing a button. It is caused by damage to the cerebellum and its pathways to other brain areas, often from a stroke or tumor, injury from a disease or an inherited disorder, or from chronic damage due to alcohol use disorder.

Functional tremor

Functional tremor (also called psychogenic tremor) can appear as any form of tremor. Its symptoms may vary but often start suddenly and fluctuate widely. The tremor may increase with attention and decrease or disappear when the person is distracted.

Enhanced physiologic tremor

Enhanced physiologic tremor typically involves a fine amplitude (small) action tremor in both the hands and the fingers. It is generally not caused by a neurological disease but by reaction to certain drugs, alcohol withdrawal, or medical conditions including an overactive thyroid and hypoglycemia. It is potentially reversible once the cause is corrected.

Parkinsonian tremor

Parkinsonian tremor is common and one of the first signs of Parkinson's disease, although not all people with Parkinson's disease have tremor. Its shaking is most noticeable when the hands are at rest and may look as if someone's trying to roll a pill between the thumb and a finger.

Parkinson's tremor may also affect the chin, lips, face, and legs. The tremor may initially appear in only one limb or on just one side of the body but may spread to both sides as the disease progresses. The tremor is often made worse by stress or strong emotions.

Orthostatic tremor

Orthostatic tremor is a rare disorder characterized by rapid muscle contractions in the legs that occur when a person stands up. The tremor usually stops when the person sits down or walks. Standing may make the person feel unsteady or unbalanced, causing them to try to sit or walk. Because this type of tremor involves very fast shaking, it may not be visible to the naked eye. Orthostatic tremor can be felt by touching the person's thighs or calves or when a doctor listens to the muscle activities with a stethoscope. In some cases, the tremor can become more severe over time. The cause of orthostatic tremor is unknown.

Who is more likely to get tremor?

Tremor is most common among middle-aged and older adults, although it can occur at any age. Generally, tremor occurs in men and women equally.

Tremor is usually caused by a problem in the parts of the brain that control movements. Most types have no known genetic cause, although there are some forms that appear to be inherited and run in families.

Tremor can occur on its own or be a symptom of other neurological disorders such as Parkinson's disease, multiple sclerosis, or stroke. Tremor sometimes can be caused by other medical conditions, including but not limited to:

- **Medicines.** Several drugs can cause tremors, including certain asthma medications, corticosteroids, chemotherapy, and drugs used for certain psychiatric and neurological disorders.
- **Heavy metals and other neurotoxins.** Exposure to heavy metals (such as mercury, manganese, lead, arsenic, etc.), organic solvents, or pesticides may cause tremors.

- **Caffeine.** Excessive caffeine may cause temporary tremor or make an existing tremor worse.
- **Thyroid disorder.** An overactive thyroid can cause tremors.
- **Liver or kidney failure.** Liver and kidney failure may cause damage in certain brain areas that leads to tremors or jerky movements.
- **Diabetes.** High or low blood sugar (hyperglycemia or hypoglycemia, respectively) may cause tremors or other involuntary movements.
- **Stress, anxiety, or fatigue** may be associated with tremors.

How is tremor diagnosed and treated?

Diagnosing tremor

To diagnose tremor, a doctor will perform a physical exam and review the person's medical history. They will perform a neurological exam and test muscle tone and strength, reflexes, balance, and speech, and evaluate:

- Whether the tremor occurs when the muscles are at rest or in action

- The location of the tremor in the body (and if it occurs on one or both sides of the body)
- The appearance of the tremor (tremor frequency and amplitude/size)

A doctor may take blood or urine samples to rule out certain contributing factors to the tremor. Diagnostic imaging may help determine if the tremor is the result of damage in the brain. An electromyogram, which measures involuntary muscle activity and muscle response to nerve stimulation, may identify muscle or nerve problems.

Additional tests can help determine any functional limitations such as difficulty with handwriting or the ability to hold a fork or cup.

Treating tremor

Although there is no cure for most forms of tremor, treatments are available to help manage symptoms. In some cases, symptoms may be mild enough that they do not need treatment. Treating any underlying health condition can sometimes cure or reduce a person's tremor.

Medications

Some medications can slow tremor. Some medications commonly used to treat tremor include:

- Beta-blocking drugs can treat essential tremor and other types of action tremor in some people.
- Certain anti-seizure medications can be effective to suppress essential tremor in people who do not respond to beta-blockers.
- Tranquilizers (also known as benzodiazepines) may be prescribed to temporarily help some people with tremor. However, these medications can negatively affect sleep, concentration, and coordination, and may cause physical dependence and withdrawal symptoms when stopped abruptly.
- Dopaminergic medications are often used to treat Parkinsonian tremors and other movement issues related to Parkinson's disease.
- Anticholinergic medications can be used to treat dystonic tremors in some people.
- Botulinum toxin (commonly known as Botox) injections can be useful for dystonic head tremor and hand tremor. It can be also used for essential tremor patients who do not respond to oral medications.

Surgery

Surgical procedures may be performed when tremor does not respond to medications or severely impacts daily life.

- **Deep brain stimulation (DBS)** is the most common form of surgical treatment of tremor. It uses surgically implanted electrodes to send high-frequency electrical signals to the thalamus, the deep structure of the brain that coordinates and controls some involuntary movements. A small pulse-generating device placed under the skin in the person's upper chest (similar to a pacemaker) sends electrical stimuli to the brain to temporarily stop tremor. DBS is currently used to treat parkinsonian tremor, essential tremor, and dystonia.
- **Radiofrequency ablation** uses a radio wave to generate an electric current that disrupts nerves' signaling ability for six or more months. It is usually performed on only one side of the brain to improve tremor on the opposite side of the body.
- **Focused ultrasound** uses MRI (magnetic resonance imaging) to deliver high frequency focused ultrasound that creates a lesion in tiny areas of the brain's thalamus thought to be causing the tremors.

The treatment is approved only for people whose essential tremor does not respond well to anti-seizure or beta-blocking drugs.

Lifestyle changes for treating tremor

Certain lifestyle changes and techniques may provide some relief for mild to moderate tremor.

- Physical, speech, and occupational therapy may help control tremor and adapt to daily challenges caused by the tremor.
- Eliminating or reducing caffeine.
- Assistive tools, such as special plates, spoons, or heavier utensils can lessen tremor and make it easier to eat.
- Take medications on time. Talk with a doctor about stopping any medications that may be contributing to the tremor.
- Reduce stress or stressful situations that can aggravate the tremor.
- Wear clothes that make it easier to dress, such as those that use Velcro instead of buttons. Consider slip-on or no-tie shoes.
- Get enough sleep. Some tremors worsen when a person is tired. Physical activity and exercise can help prevent fatigue and improve sleep.

What are the latest updates on tremor?

The National Institute of Neurological Disorders and Stroke (NINDS), a component of NIH, the leading supporter of biomedical research in the world, is the primary federal funding agency on tremor and other neurological disorders.

Researchers are working to better understand the underlying brain functions that cause tremor, identify the genetic factors that make individuals more likely to have tremor, and develop new and better treatment options.

Identifying brain functioning and disease markers

NINDS researchers are using non-invasive neuroimaging techniques to identify structural and functional changes in the brain. By developing sensitive and specific markers for movement disorders such as Parkinson's disease and essential tremor, researchers can track changes as diseases progress. Other researchers are using functional MRI technology to better understand normal and diseased brain circuit functions and associated motor behaviors. Scientists also hope

to develop digital tools capable of monitoring tremor in real-time, outside of the clinic, which may help optimize the treatment. Some researchers are studying brain tissue donated by individuals with and without tremor to identify the brain changes associated with tremor and gain deeper insight into its cause and potential treatment targets.

Genetic discoveries

Essential tremor may have a strong genetic component affecting multiple generations of families. NINDS researchers are building on previous genetics work to identify genes that make people more susceptible to familial early-onset (before age 40) essential tremor. Researchers are focusing on multigenerational, early tremor onset families to better detect connections. Additionally, NINDS scientists are researching the impact of genetic changes on the development of essential tremor.

Medications and other treatment methods

Medications are effective in about 50% of individuals with tremor. In order to develop assistive and rehabilitative devices for people with essential tremor, researchers are exploring

where and how to minimize or suppress tremor while still allowing for voluntary movements.

Many people with essential tremor respond to ethanol (alcohol); however, it is not clear why or how. NINDS researchers are studying the impact of ethanol on tremor to determine the correct dosage amount and its physiological impact on the brain, and whether other medications without the side effects of ethanol can be effective.

Other NIH researchers hope to identify the source of essential tremor, study the effects of currently available tremor-suppressant drugs on the brain, and develop more targeted and effective therapies.

How can I or my loved one help improve care for people with tremor?

Consider participating in a clinical trial so clinicians and scientists can learn more about tremor and related disorders. Clinical research uses human volunteers to help researchers learn more about a disorder and perhaps find better ways to safely detect, treat, or prevent disease.

All types of volunteers are needed—those who are healthy or may have an

illness or disease—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 participating in clinical research visit NIH Clinical Research Trials and You at www.nih.gov/health-information/nih-clinical-research-trials-you. Learn about clinical trials currently looking for people with tremor at Clinicaltrials.gov.

Where can I find more information about tremor?

The following resources may provide information about tremor:

Diann Shaddox Foundation for Essential Tremor

Phone: 803-761-2860

www.diannshaddoxfoundation.org

HopeNET

Phone: 804-754-4455

<https://thehopenet.org>

International Essential Tremor Foundation

Phone: 913-341-3880 or 888-367-3667

<https://essentialtremor.org>

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