



Movement Disorders

Movement disorders are a group of nervous system conditions that cause spasms, jerking, shaking, or that hinder movement. They may be caused by diseases, genetic conditions, medications, or other factors.

Your doctor will conduct a physical exam with a neurological assessment and check your muscle control and your reflexes to help diagnose your condition. Head MRI, Head CT, PET, CT angiography, MR angiography, and other tests may be used to rule out other conditions and confirm your diagnosis.

Treatment will depend on the underlying condition causing your abnormal movements (or lack of movement). These may include watchful waiting, Deep Brain Stimulation (DBS), or medication.



What are movement disorders?

Movement disorders are a group of nervous system conditions that cause abnormal movements, such as spasms, jerking or shaking, or, in some cases, a lack of movement. These disorders can affect daily activities like walking along with more complex tasks like writing or playing the piano.

Movement disorders are typically characterized as one of three types: hyperkinetic, or marked by excessive amount of movement; hypokinetic, in which there is abnormally reduced intentional movement; and dyskinesia, or abnormal involuntary movements.

Movement disorders may be caused by a genetic condition, traumatic injury, nervous system disease, infections, medication side effects, and other factors. The risk of developing a movement disorder increases with age. A history of previous stroke and the presence of cardiovascular risk factors such as high blood pressure and diabetes may increase the risk of developing a movement disorder related to blood flow (circulation).

Symptoms of movement disorders can include:

- tremor, or a rhythmic, involuntary muscle movement that causes shaking in one or more parts of the body – usually in the hands, but also in the arms, legs, trunk, head, face and voice

- jerks/twitches, often in response to loud noises, certain kinds of lighting, or bursts of pain
- spasms/contractions that may be intermittent or unchanging over time, such as a clenched hand or a twisted foot
- problems walking, which can be seen when patients with functional weakness in one leg "drag" that leg

A very common movement disorder is Parkinson's disease, a progressive condition characterized by tremor, stiffness, slowness of movement, and difficulty walking. Other types of movement disorders include:

- essential tremor, a condition that causes uncontrollable shaking in different parts of the body, including the hands, head, or voice
- Tourette syndrome, characterized by involuntary movements and sounds referred to as tics
- dystonia, a disorder marked by abnormal twisting or fixed muscle contractions.
- restless legs syndrome, a condition that leads to uncomfortable sensations in the legs or other parts of the body, causing a person to want to move those areas to relieve these sensations
- spasticity, or continuous muscle contractions that can interfere with movement

How are movement disorders diagnosed and evaluated?

To diagnose a movement disorder, your physician will begin with a medical history and a physical exam with a neurological assessment, including checking motor skills and reflexes. You may be asked to walk a short distance to look for any problems with the way you walk.

Additional diagnostic tests may be ordered, including:

- blood tests
- a lumbar puncture to analyze the cerebrospinal fluid
- electromyography, a test to measure the electrical impulses along nerves, nerve roots and muscle tissue
- electroencephalogram (EEG), a test to check the electrical activity of the brain
- electrocardiogram (ECG or EKG) to check the heart's electrical activity and determine if heart problems are causing the disorder
- a muscle biopsy to distinguish between nerve and muscle disorders

Imaging tests are often used to help diagnose movement disorders. Although imaging alone is not enough to provide a definitive diagnosis, it is often useful in clarifying the clinical findings. The following imaging tests may be ordered:

- Magnetic Resonance Imaging (MRI) - Head: MRI can detect abnormalities such as atrophy in certain parts of the brain that are associated with movement disorders.
- Positron Emission Tomography (PET): Functional and neurochemical brain imaging with PET helps provide insight into movement disorders by providing information on brain metabolism and chemistry.

Since the symptoms of movement disorders can be similar to those of stroke and vascular disease,

imaging tests may be used to look at the vessels supplying blood to the brain. Examples include:

- **MR Angiography (MRA):** MRA can be used to image the cerebral vessels and look for abnormalities that may help explain problems with movement. MR perfusion provides additional information by showing blood flow in the brain.
- **Computed tomography (CT) - Head:** Physicians use CT of the head to distinguish movement disorders from a blood clot or bleeding within the brain.
- **CT Angiography (CTA):** In CTA, a contrast material is injected intravenously and images are obtained of the cerebral blood vessels to improve the detection of vascular lesions that can contribute to movement disorders.
- **Ultrasound - Carotid:** Physicians use a special ultrasound technique called Doppler ultrasound to check for narrowing and blockages in the body's two carotid arteries that could lead to a stroke and cause a movement disorder.
- **Cerebral Angiography:** Cerebral angiography is a minimally invasive procedure that produces pictures of major blood vessels in the brain, helping physicians detect or confirm abnormalities such as a blood clot or narrowing of the arteries.

How are movement disorders treated?

Watchful waiting may be prescribed for some cases of movement disorders, while others require more aggressive treatments. Injections and medications are sometimes used, including:

- beta blockers, a blood pressure medication that can reduce shaking and other physical symptoms of movement disorders
- antiseizure medications to reduce tremors, especially in the hands
- anticholinergic agents that treat dystonia by reducing the effects of a brain chemical called acetylcholine, resulting in decreased tremors or muscle stiffness
- anti-anxiety medications that work on the central nervous system and relax the muscles to provide short-term relief from spasms
- botulinum toxin, commonly known as Botox®, that works by blocking certain chemicals in the brain called neurotransmitters, which are responsible for muscle spasms

A two-part surgical procedure known as Deep Brain Stimulation (DBS) can significantly reduce involuntary movements in people with movement disorders. The first part of the procedure involves implanting a small electrode in the brain under general anesthesia. During the second surgery, the wire from the electrode is connected to a pulse generator, a small battery pack that can send electrical impulses with the push of a button. Once the electrode is in place, patients can adjust the strength of the electrical impulses on their own. They will work with a neurologist to determine the combination of settings that best controls their symptoms.

MR-guided Focused Ultrasound (MRgFUS), a procedure in which focused beams of sound energy are used to heat and destroy a small volume of brain tissue without harming adjacent tissue, is being studied as a treatment for some movement disorders.

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