

## **Definition**

Paralysis is defined as complete loss of strength in an affected limb or muscle group.

## **Description**

The chain of nerve cells that runs from the brain through the spinal cord out to the muscle is called the motor pathway. Normal muscle function requires intact connections all along this motor pathway. Damage at any point reduces the brain's ability to control the muscle's movements. This reduced efficiency causes weakness, also called paresis. Complete loss of communication prevents any willed movement at all. This lack of control is called paralysis. Certain inherited abnormalities in muscle cause periodic paralysis, in which the weakness comes and goes.

The line between weakness and paralysis is not absolute. A condition causing weakness may progress to paralysis. On the other hand, strength may be restored to a paralyzed limb. Nerve regeneration or regrowth is one way in which strength can return to a paralyzed muscle. Paralysis almost always causes a change in muscle tone. Paralyzed muscle may be flaccid, flabby, and without appreciable tone, or it may be spastic, tight, and with abnormally high tone that increases when the muscle is moved.

Paralysis may affect an individual muscle, but it usually affects an entire body region. The distribution of weakness is an important clue to the location of the nerve damage that is causing the paralysis. Words describing the distribution of paralysis use the suffix "-plegia," from the Greek word for "stroke." The types of paralysis are classified by region:

monoplegia, affecting only one limb

diplegia, affecting the same body region on both sides of the body (both arms, for example, or both sides of the face)

hemiplegia, affecting one side of the body

paraplegia, affecting both legs and the trunk

quadriplegia, affecting all four limbs and the trunk

## **Causes and symptoms**

The nerve damage that causes paralysis may be in the brain or spinal cord (the central nervous system) or it may be in the nerves outside the spinal cord (the peripheral nervous system). The most common causes of damage to the brain are:

stroke

tumor

trauma (caused by a fall or a blow)

multiple sclerosis (a disease that destroys the protective sheath covering nerve cells)

cerebral palsy (a condition caused by a defect or injury to the brain that occurs at or shortly after birth)

metabolic disorder (a disorder that interferes with the body's ability to maintain itself)

Damage to the spinal cord is most often caused by trauma, such as a fall or a car crash. Other conditions that may damage nerves within or immediately adjacent to the spine include:

tumor

herniated disk (also called a ruptured or slipped disk)

spondylosis (a disease that causes stiffness in the joints of the spine)

rheumatoid arthritis of the spine

neurodegenerative disease (a disease that damages nerve cells)

multiple sclerosis

Damage to peripheral nerves may be caused by:

trauma

compression or entrapment (such as carpal tunnel syndrome)

Guillain-Barré syndrome (a disease of the nerves that sometimes follows fever caused by a viral infection or immunization)

chronic inflammatory demyelinating polyradiculoneuropathy (CIDP) (a condition that causes pain and swelling in the protective sheath covering nerve cells)  
radiation  
inherited demyelinating disease (a condition that destroys the protective sheath around the nerve cell)  
toxins or poisons

### **Symptoms**

The distribution of paralysis offers important clues to the site of nerve damage. Hemiplegia is almost always caused by brain damage on the side opposite the paralysis, often from a stroke. Paraplegia occurs after injury to the lower spinal cord, and quadriplegia occurs after damage to the upper spinal cord at the level of the shoulders or higher (the nerves controlling the arms leave the spine at that level). Diplegia usually indicates brain damage, most often from cerebral palsy. Monoplegia may be caused by isolated damage to either the central or the peripheral nervous system. Weakness or paralysis that occurs only in the arms and legs may indicate demyelinating disease. Fluctuating symptoms in different parts of the body may be caused by multiple sclerosis.

Sudden paralysis is most often caused by injury or stroke. Spreading paralysis may indicate degenerative disease, inflammatory disease such as Guillain-Barré syndrome or CIDP, metabolic disorders, or inherited demyelinating disease.

Other symptoms often accompany paralysis from any cause. These symptoms may include numbness and tingling, pain, changes in vision, difficulties with speech, or problems with balance. Spinal cord injury often causes loss of function in the bladder, bowel, and sexual organs. High spinal cord injuries may cause difficulties in breathing.

### **Prevention**

Prevention of paralysis depends on prevention of the underlying causes. Risk of stroke can be reduced by controlling high blood pressure and cholesterol levels. Seat-belts, air bags, and helmets reduce the risk of injury from motor vehicle accidents and falls. Good prenatal care can help prevent premature birth, which is a common cause of cerebral palsy.