Paralysis

Paralysis is loss of muscle function for one or more muscles. Paralysis can be accompanied by a loss of feeling (sensory loss) in the affected area if there is sensory damage as well as motor. About 1 in 50 people have been diagnosed with some form of paralysis, transient or permanent.

The word comes from the Greek παράλυσις, “disabling of the nerves”,itself from παρά (para), “beside, by” and λύσις (lysis), “loosing” and that from λύω (luō), “to loose”.

Classification

The classification of paralysis generally depends on the region of the body affected and the extent of the paralysis. Here are the main types:

Localized Paralysis: Affects a specific part of the body, such as the face, hands, feet, or vocal cords.

Example: Bell's palsy, which affects facial muscles.

Generalized Paralysis: Affects a more significant portion or even the whole body, divided into several categories based on the extent and distribution:

Monoplegia: Paralysis of one limb.

Hemiplegia: Paralysis of the arm and leg on one side of the body.

Paraplegia: Paralysis of both legs and, in some cases, part of the trunk.

Quadriplegia (or Tetraplegia): Paralysis of all four limbs, and often the torso.

Other Types of Paralysis:

Flaccid Paralysis: Characterized by weak, floppy muscles without much control.

Spastic Paralysis: Involves stiff and hard muscles with spasms.

The cause of paralysis is also an important aspect of its classification. Common causes include:

Neurological conditions like stroke, cerebral palsy, or multiple sclerosis.

Trauma such as spinal cord injury.

Peripheral nerve injury which might occur due to accidents or medical conditions like diabetes.

Management and treatment depend on the underlying cause and the type of paralysis, often requiring a multidisciplinary approach including physical therapy, medication, and possibly surgery.

Outcome

The significance of the spinal circuitry in controlling postural and locomotor functions largely re-emerged in the mid-1970s under the leadership of Sten Grillner, demonstrating key phenomena of "central pattern generator" and "fictive locomotion" with an evolutionary perspective. These concepts raised the question of how much function can be recovered after paralysis, given the intrinsic automaticity of spinal networks in injured and uninjured states in adults.

A review explores biological mechanisms governing spinal control of movements such as posture and locomotion. They focused on concepts that have evolved from experiments performed over the past decade. Rather than a comprehensive review of the vast literature on the neural control of posture and locomotion, they focused on the various mechanisms underlying functional automaticity, and their clinical relevance.

They proposed that multiple combinations of sensory mechanoreceptors linked to proprioception generate an infinite number of different sensory ensembles, having species-specific meaning and extensive influence in controlling posture and locomotion. These sensory ensembles are translated as a probabilistic phenomenon into highly specific but indeterminate actions. Therefore, they opined that spinal translation of these ensembles in real-time plays a central role in the automaticity of motor control in individuals with and without severe neuromotor dysfunction [1)].

1)
Edgerton VR, Gad P. Spinal automaticity of movement control and its role in recovering function after spinal injury. Expert Rev Neurother. 2022 Aug 31. doi: 10.1080/14737175.2022.2115359. Epub ahead of print. PMID: 36043398.