



# SPEAKING OF STROKE:

## WHY SPEECH MAY BE AFFECTED BY STROKE

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**S**peech is the most complex of all human movements. In order to speak, numerous muscles that control the tongue, lips, soft palate, jaw and larynx (voice box) need to move very rapidly. These muscles also need to move in a coordinated manner with each other as well as with the muscles that control respiration.

### How We Speak

Speech requires that the lungs generate a stream of air that sets the vocal folds (muscles in the larynx) into vibration. The vibrating air stream moves through our throat, mouth and nose. Our vocal folds, tongue, lips, jaw, teeth and soft palate are used to change the air stream into different speech sounds.

The nerves that control our speech muscles are part of a complex and widespread network. Normal speech requires nerve signals to be sent from the highest centers of the brain (cortex) to the nerves that stimulate the muscles, with various connections along the way. Damage to any part of the nervous system that directs speech can result in speech problems. Therefore, a stroke involving the brain, brain stem, cerebellum or spinal cord can cause speech problems. A sudden onset of disturbed speech production can often be one of the earliest signs that a stroke may be occurring.

### Speech vs. Language

It should be noted that “speech” problems differ from “language” problems, which also can occur after stroke. When there is damage to the language areas of the brain (for most of us, this is the brain’s left hemisphere), aphasia may result. Aphasia is not a *speech* problem; the physical act of speaking is intact with aphasia. Instead, aphasia involves *language* problems such as word-finding difficulties, sentence construction errors, language comprehension problems, etc. Aphasia can exist along with speech disorders.

There are two major types of speech problems that can occur following stroke: **apraxia of speech** and **dysarthria**. Symptoms will depend upon the areas of the nervous system that have been damaged.

## The two major types of speech problems associated with stroke are apraxia of speech and dysarthria.

### Apraxia of Speech

Apraxia of speech most often follows a stroke that affects the language-dominant hemisphere of the brain. It is usually associated with damage to the areas of the brain supplied by the left, middle cerebral artery. Apraxia of speech may range in severity from a complete inability to speak to very mild, barely detectable distortions of speech. A person with apraxia of speech may:

- Speak more slowly. Individual sounds may be produced more slowly and there may be abnormally long intervals between words or syllables (e.g., “speak...ing.....o...ccurs... more...slow...ly”).
- Have trouble with words that have more than one or two syllables (e.g., “statistical,” “calculate”).
- Have a harder time saying certain sounds. Speech sounds that are produced incorrectly may sound distorted or imprecise.
- Have trouble saying blends (e.g., STRange, SPLotch, BLush).

Speakers with apraxia of speech usually are well aware of their errors and may become frustrated with their inability to correctly articulate what they wish to say. They may experience difficulty in placing their articulators (for example, lips or tongue) in the correct positions and thus, may appear to be groping for speech. The muscles for speech are not weak and usually function properly during nonspeech tasks (e.g., chewing, kissing, smiling).

Apraxia of speech is thought to occur because the brain has difficulty retrieving the speech movement plans that were learned as a child. As such, speech-language therapy for apraxia of speech often involves repeated practice of speech movements to help improve retrieval of movement plans. Apraxia of speech frequently occurs with aphasia. It may be difficult to determine whether the aphasia or the apraxia of speech interferes more with communication. Therapy may need to address both problems.

### Dysarthria

Dysarthria is the second major type of speech disturbance that can result from stroke. There are several types of dysarthria, and each is determined by the portion of the nervous system that is injured. In treatment, it is very important to understand how the damaged nervous system is affecting the muscles and their movements. For example:

- Strokes that damage both hemispheres of the brain can cause the speech muscles to have too much muscle tone (a tight feeling) and to move slowly and with difficulty.

- Strokes that affect the brain stem or spinal cord can cause the speech or respiratory muscles to be weak and lacking in muscle tone.
- A stroke in the cerebellum can affect the ability to coordinate the speech muscles.
- Damage to structures deep in the brain (e.g., basal ganglia) can lead to excessive or extraneous movements of the muscles.

The survivor’s speech-language pathologist (SLP) should be able to identify the specific type of dysarthria. Therapy should address the underlying causes of the disrupted speech. For example, strengthening exercises are appropriate when the muscles are weak, but may be harmful when the muscles have too much tone. During the period of spontaneous recovery, when the nervous system is in the healing process, it can be anticipated that dysarthria symptoms will improve. Therapy may speed this improvement. After the phase of spontaneous recovery has ceased (usually after six to 12 months), speech improvements can be achieved with therapy. If speech continues to significantly interfere with communication, the SLP should be able to recommend options for supplementing speech, known as augmentative and alternative communication (AAC).

Fortunately, the type of dysarthria (i.e., *unilateral uppermotor neuron dysarthria*) that results from a single stroke in either the left or the right hemisphere rarely requires therapy. It is usually mild and often disappears within months after the stroke. Symptoms include imprecise sound production, slightly slowed rate of speech, incoordination of speech and harsh-sounding voice.

Stroke may have a significant impact on speech production and consequently, the ability to communicate. It is important to remember that speech will usually improve in the weeks and months following the stroke. Speech-language therapy may assist the recovery process with apraxia of speech or dysarthria and can result in speech production improvements long after brain healing has stopped. **SC**

### Resources

1. Access speech-language treatment guidelines for dysarthria and apraxia of speech at [ancds.org](http://ancds.org) (Academy of Neurologic Communication Disorders and Sciences).

2. Find information concerning augmentative and alternative communication at [www.isaac-online.org/en/aaach/what\\_is.html](http://www.isaac-online.org/en/aaach/what_is.html).

To find an ASHA-certified speech-language pathologist near you, go to [asha.org](http://asha.org) and click on “Find a Professional” or call (800) 638-8255.



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