

# Dysarthria and dysphasia

## What are dysarthria and dysphasia?

Dysarthria is a disorder of speech, while dysphasia is a disorder of language.

- Speech is the process of articulation and pronunciation. It involves the bulbar muscles and the physical ability to form words.
- Language is the process in which thoughts and ideas become spoken. It involves the selection of words to be spoken, called semantics, and the formulation of appropriate sentences or phrases, called syntax.

## Definitions

Dysarthria is a speech disorder caused by disturbance of muscular control. Dysphasia (also called aphasia) is an impairment of language. They often co-exist.

Strictly speaking, the words anarthria and aphasia mean a total absence of ability to form speech or language but they are often used when dysarthria and dysphasia would be more correct. In particular, dysphasia and aphasia are used interchangeably, with aphasia in more common use.

Dysphasia can be receptive or expressive. Receptive dysphasia is difficulty in comprehension, whilst expressive dysphasia is difficulty in putting words together to make meaning. In reality there is usually considerable overlap of these conditions but a person who has pure dysarthria without dysphasia would be able to read and write as normal and to make meaningful gestures, provided that the necessary motor pathways are intact.

Apraxia of speech is different to both dysphasia and dysarthria, and is the loss of ability to plan and execute the oral motor tasks needed in order to speak .

Inability to write is agraphia or dysgraphia if incomplete. Inability to manipulate numbers is acalculia or dyscalculia if incomplete. Difficulty reading is dyslexia.

## **Dominant hemisphere**

The speech area is in the left, dominant side of the brain in about 99% of right-handed people. The remaining 1% may represent inherent left-handers who have been forced to write with their right. In left-handed people, the right hemisphere is the dominant side in only 30%. Thus impairment of the speech area with a stroke, causing left-sided weakness, is rare. It will occur in virtually no right-handers and in only 30% of left-handers.

As a general rule, a lesion of the left hemisphere will cause dysphasia whilst, in the right hemisphere, it will cause neglect, visuo-spatial and cognitive problems.

## **How common are dysarthria and dysphasia? (Epidemiology)**

The aetiology is damage or disease of the brain and so it is most common with advancing age. Disease is usually vascular, neoplastic or degenerative. Around 85% of cases arise from strokes and around a third of people who have strokes will have dysphasia.<sup>[1]</sup> In younger people it is usually a result of head injury.

## **Dysarthria**

### **Causes of dysarthria**

Dysarthria is caused by upper motor neurone lesions of the cerebral hemispheres or lower motor neurone lesions of the brain stem. It also results from disruption to the integrated action of upper motor neurones, basal ganglia and cerebellum.

### **Features of dysarthria**

There may be some variation depending upon the site of the lesion.

- Slurred and weak articulation with a weak voice is typical of pseudobulbar palsy from a stroke. Other neurological signs are usually unilateral with a right-sided hemiplegia (left side of brain). It may be on the left in a minority of left-handers. Brain stem stroke may lead to bilateral signs with dysarthria or anarthria.
- Slurred, scanning and staccato speech caused by cerebellar lesions is typical of [multiple sclerosis](#).
- A dysrhythmic, dysphonic and monotonous voice is caused by disease of the extrapyramidal system in [Parkinson's disease](#). Movement is rigid and stiff in Parkinson's disease and that includes phonation.
- Indistinct articulation, hypernasality and bilateral weakness caused by lower motor neurone disorders can occur with [motor neurone disease](#).

### **Management of dysarthria**

Speech and language therapy is required to assess and treat the bulbar and facial muscles. A programme of exercises is developed to improve muscle tone and movement to match the individual's needs. A Cochrane review showed there is a lack of good-quality trials in this area, and effectiveness remains unproven.<sup>[2]</sup> Current guidelines recommend people with dysarthria be assessed by a speech and language therapist, taught techniques to improve speech clarity, and assessed for advice on alternative methods of communication.<sup>[3]</sup>

## **Dysphasia**

### **Causes of dysphasia**

Dysphasia is impaired ability to understand or use the spoken word. It is due to a lesion of the dominant hemisphere and may include impaired ability to read, write and use gestures. The most common cause is cerebrovascular disease but it can arise from a [space-occupying lesion](#), [head injury](#) or [dementia](#).

### **Features of dysphasia**

Dysphasia can be seen as a disruption in the links between thought and language. The diagnosis is made only after excluding sensory impairment of vision or hearing, perceptual impairment (agnosia), cognitive impairment (memory), impaired movement (apraxia) or thought disturbance, as in dementia or schizophrenia. When testing for dysarthria and dysphasia, the patient's ability to repeat or produce difficult phrases or tongue-twisters can be indicative.

- People with receptive dysphasia often have language that is fluent with a normal rhythm and articulation but it is meaningless as they fail to comprehend what they are saying.
- People with expressive dysphasia are not fluent and have difficulty forming words and sentences. There are grammatical errors and difficulty finding the right word. In severe cases they do not speak spontaneously but they usually understand what is said to them.

Specific types of dysphasia are associated with damage to particular cortical regions but in practice distinctions are not always clear. Language is a complex activity involving many cortical and subcortical areas, and lesions do not dissect clearly demarcated anatomical areas. Generally, expressive dysphasia suggests an anterior lesion while receptive dysphasia suggests a posterior lesion. There are several subtypes. They are:

- **Sensory (Wernicke's) dysphasia/aphasia** - lesions are located in the left posterior perisylvian region and primary symptoms are general comprehension deficits, word retrieval deficits and semantic paraphasias. Lesions in this area damage the semantic content of language while leaving the language production function intact. The consequence is a fluent or receptive aphasia in which speech is fluent but lacking in content. Patients lack awareness of their speech difficulties. Semantics is the meaning of words. Semantic paraphasia is the substitution of a semantically related but incorrect word.

- **Production (Broca's) dysphasia/aphasia** - lesions are located in the left pre-central areas. This is a non-fluent or expressive aphasia since there are deficits in speech production, prosody and syntactic comprehension. Patients will typically exhibit slow and halting speech but with good semantic content. Comprehension is usually good. Unlike Wernicke's aphasia, Broca's patients are aware of their language difficulties. Prosody is the study of the meter of verse. Here it means the rhythm of speech.
- **Conduction dysphasia/aphasia** - lesions are around the arcuate fasciculus, posterior parietal and temporal regions. Symptoms are naming deficits, inability to repeat non-meaningful words and word strings, although there is apparently normal speech comprehension and production. Patients are aware of their difficulties.
- **Deep dysphasia/aphasia** - lesions are in the temporal lobe, especially those mediating phonological processing. Symptoms are word repetition problems and semantic paraphasia (semantically related word substituted when asked to repeat a target word).
- **Transcortical sensory dysphasia/aphasia** - lesions are in the junction areas of the temporal, parietal and occipital areas of left hemisphere. Symptoms are impaired comprehension, naming, reading, writing and semantic irrelevancies in speech.
- **Transcortical motor dysphasia/aphasia** - lesions are located between Broca's area and supplementary motor area. Symptoms are transient mutism, telegrammatic speech, and dysprosodic speech. Telegrammatic means omitting unimportant words, as was done when sending a telegram. Dysprosodic speech is monotone.
- **Global dysphasia/aphasia** - occurs with extensive damage to the left perisylvian region, white matter, basal ganglia and thalamus. Symptoms are extensive and generalised deficits in comprehension, repetition, naming and speech production.

### **Examining patients with dysphasia**

Tests for receptive dysphasia may include asking patients to read words or a passage. They are then asked to explain words or the passage.

Comprehension of spoken material is assessed by asking the patient to listen to a passage and explain it or, alternatively, by asking them to follow certain instructions such as: "Point to the door." Tests for expressive dysphasia include:

- Asking the patient to name a series of objects and some of their parts. For example, ask the patient, "What is this?", pointing to a pen, your tie and watch in turn. Then ask, "What part of the watch is this?", pointing to the strap and then the face or hands.
- If language is limited then dysphasia may be tested by holding up a pen and asking, "Is this a pen?" If the patient says, "Yes", then point to your watch and ask, "Is this a pen?" This demands a different reply. Look out for difficulty in finding the right word and perseveration. This is inappropriate repetition of the same word or phrase.
- Can the patient talk spontaneously on a familiar topic? "Tell me about your family." "Tell me about the work you used to do."
- Can the patient count numbers or recite days of the week? Write a brief dictated passage? Write a brief spontaneous passage? Copy a short passage?

All tests of literacy and numeracy must be interpreted in the light of premorbid function. For example, impairment in numeracy in a former accountant probably represents a substantial decline.

### **Management of dysphasia**

Referral to speech and language therapy (SLT) is the usual practice for dysphasia where a thorough assessment of the nature of the problem is followed by exercises to encourage the recovery of fluent speech and understanding. Therapy tends to be tailored to the needs of the individual patient. Cochrane reviews provide evidence of the effectiveness of SLT for people with aphasia following stroke, in terms of improved functional communication, reading, writing, and expressive language compared with no therapy. There is also some indication that therapy at high intensity, high dose or over a longer period may be beneficial.<sup>[4]</sup>

Constraint-induced aphasia therapy (CIAT) has been widely used in post-stroke aphasia rehabilitation and an increasing number of clinical controlled trials have investigated the efficacy of the CIAT for the post-stroke aphasia. Currently there is limited evidence to support its superiority to other aphasia therapies but therapy embedded with social interaction may gain more benefits.<sup>[5]</sup>

### **Prognosis**

Approximately 40–60% of stroke survivors may retain some degree of dysphasia, which is associated with lower independence, less social participation, poorer rehabilitation outcomes and worsened quality of life. [5] Severe dysphasias are likely to show little improvement but other forms can show rapid improvement. The probability of recovery following trauma is higher than following stroke.

Prognosis for the recovery of linguistic function varies enormously and is difficult to predict as it is affected by many factors. There is a possibility that some drugs may enhance the ability to learn and hence to recover language after a stroke but this is still very much in the experimental stage and there are no large trials or reviews.

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## Further reading

- [Chiaramonte R, Vecchio M](#); Dysarthria and stroke. The effectiveness of speech rehabilitation. A systematic review and meta-analysis of the studies. *Eur J Phys Rehabil Med.* 2021 Feb;57(1):24–43. doi: 10.23736/S1973–9087.20.06242–5. Epub 2020 Jun 9.
- [Palmer R, Pauranik A](#); Rehabilitation of Communication Disorders.

## References

1. [Stroke and TIA](#); NICE CKS, December 2023 (UK access only)
2. [Mitchell C, Bowen A, Tyson S, et al](#); Interventions for dysarthria due to stroke and other adult-acquired, non-progressive brain injury. *Cochrane Database Syst Rev.* 2017 Jan 25;1:CD002088. doi: 10.1002/14651858.CD002088.pub3.
3. [Stroke rehabilitation in adults](#); NICE guidance (October 2023)
4. [Brady MC, Kelly H, Godwin J, et al](#); Speech and language therapy for aphasia following stroke. *Cochrane Database Syst Rev.* 2016 Jun 1;(6):CD000425. doi: 10.1002/14651858.CD000425.pub4.
5. [Zhang J, Yu J, Bao Y, et al](#); Constraint-induced aphasia therapy in post-stroke aphasia rehabilitation: A systematic review and meta-analysis of randomized controlled trials. *PLoS One.* 2017 Aug 28;12(8):e0183349. doi: 10.1371/journal.pone.0183349. eCollection 2017.

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