

Aphasia/PGS/diagnosis

Aphasia is an acquired speech disorder that arises on the basis of **focal** brain damage, most often **cortical** areas of the **dominant hemisphere**. In terms of location, the most common causes of aphasia are cortical lesions, namely **perisylvian areas (Broca's and Wernicke 's areas), lesions in the fasciculus arcuatus, gyrus angularis, inferior gyrus frontalis, gyrus supramarginalis** , and lesions in the subcortical areas of the **thalamus and basal ganglia** .

The most common causes of aphasia are **vascular causes** (ischemia or hemorrhage in the ACI basin (internal carotid artery)), as well as **tumors and head trauma**.

Symptoms

Aphasia manifests itself in the impairment of the ability to use language in all its levels. Symptoms of aphasia include **speech fluency disorders, speech comprehension disorders, paraphasia, anomia, and agrammatism. Echolalia, speech automatisms, perseveration, circumlocution, satiation, reading and writing disorders** may occur (the above symptoms of aphasia are explained in more detail in Table 1.).

Symptom name	Symptom description
Disorders of speech fluency	<ul style="list-style-type: none"> ▪ Nonfluent speech , i.e. "non-fluent" speech - cumbersome speech with a slow pace that seems monotonous, one-word messages or short sentences (usually max. 3-4 words) with errors in sentence structure (absence of verbs, prepositional phrases, etc.), even if the patient produces some phrases quite fluently. Messages are often poor in content. <p>Example (Broca's aphasia): <i>"What happened to you?" - answer: "Well... it's... well... I can't."</i> (video 01)</p> <ul style="list-style-type: none"> ▪ Fluent speech , i.e. "flowing" speech - a message of reasonable or even excessive length and speed, produced without apparent effort, but the content can be very vague or completely empty. <p>Example (anomic aphasia): <i>"Where did you work?" - answer: "Well, I worked in ... well, as a clerk, you see, I can't say the place."</i></p> <p>Example (Wernicke's aphasia): <i>"What is your occupation?" - answer: "I tó tektilo 5 calf."</i> (video 02)</p>
Comprehension disorders	<ul style="list-style-type: none"> ▪ The patient does not show the named objects, does not understand our calls, in milder cases only fails to understand more complex longer messages. <p>Example: comprehension impairment in a posterior lesion (video 03)</p> <p>Example: comprehension impairment in an anterior lesion (video 04)</p>
Paraphasia	<ul style="list-style-type: none"> ▪ Semantic - interchange of words close in meaning or even distant. <p>Example: instead of bread, he says <i>"roll"</i> , <i>"hat"</i> ...</p> <ul style="list-style-type: none"> ▪ Phonemic - swapping, omitting, transposing or adding phonemes in words. <p>Example: instead of bus, say <i>"aukebus"</i> .</p> <p>See video 05 for examples of paraphasias .</p>
Neologisms	<ul style="list-style-type: none"> ▪ Nonexistent words. <p>Example (Wernicke's aphasia): <i>"What difficulties do you have?" - answer: "Five is difficult."</i></p> <ul style="list-style-type: none"> ▪ Speech containing almost exclusively neologisms is called jargon . <p>Example: video 06</p>
Anomie	<ul style="list-style-type: none"> ▪ Difficulty updating concepts. <p>Example: pen - <i>"Well, that's, well..., that..."</i></p>
Circumlocution	<ul style="list-style-type: none"> ▪ The patient tries to bridge the difficulties with updating the concepts with a description. <p>Example (anomic aphasia): pen - <i>"Well, sure, I know, that's what it is, but you know what, I have it too, here, ...it's a...pen for writing!"</i></p> <p>(See also video 07.)</p>

Echolalia	<ul style="list-style-type: none"> ▪ Echoic repetition of what is heard (typical of transcortical forms of aphasia). <p>Example: "How are you today?" - answer: "How are you today?"</p>
Speech automatisms	<ul style="list-style-type: none"> ▪ Involuntary stereotyped repetition of syllables, words, phrases (in severe forms of aphasia). <p>Example (global aphasia): "What's your name?" - answer: "Well, well, well, well!", "How are you today?" - answer: "Well, well, well, well!", "What is?" - the answer: "Well, well, well, well!"</p>
Agrammatisms	<ul style="list-style-type: none"> ▪ Impairment in the formation of grammatical forms, especially evident when trying to answer in a complete sentence. <p>Example (Broca's aphasia): "What did you do today?" - answer: "Today food, I'm the post office...retirement, well, the wife also pensions, then she has lunch..."</p> <p>(See also video 01.)</p>
Perseverance	<ul style="list-style-type: none"> ▪ Sticky reactions - the patient reacts to new questions, tasks in quick succession in the same way (movement, gesture, word) that he used to answer the previous question. <p>Example (Broca's aphasia): "Are you wearing pyjamas?" - response: the patient nods his head "yes". "And are we in the hotel now?" - answer: the patient perseveres - nods "yes".</p> <p>Example (Broca's aphasia): "What is that?" (pencil) - answer: "Pencil." "And what is this?" (handkerchief) - answer: "Pencil."</p> <p>(See also video 8a and video 8b)</p>
Satiation	<ul style="list-style-type: none"> ▪ Alienation of the meaning of the word - a pathognomonic symptom of Wernicke's aphasia, manifests itself during the examination of spoken comprehension. <p>Example: we ask the patient - "Show the window!", "Show the door!", "Show the bed!", "Show the window!" (during this call, the patient begins to hesitate and points to something else)</p>

Classification

In our neurology, aphasias are still often divided into "**expressive**" (motor, more recently **nonfluent**), "**perceptual**" (receptive, sensory, more recently **fluent**) and "**mixed**" (total, **global**). "Expressive" aphasias mainly represent anterior involvement of the brain, "perceptual" aphasia posterior involvement (the border is the **sulcus centralis**). Patients with an "expressive" phatic disorder more often have **hemiparesis or hemiplegia** , in patients with a "perceptual" type of phatic disorder, **motor impairment is less pronounced**. The division of aphasia into "motor" (or "expressive") and "sensory" (or "perceptual") is misleading due to its simplified concept and has already been completely abandoned in world aphasiology (all patients with an "expressive" speech disorder have measures also difficulties with understanding what is spoken - at least at the level of more complex grammatical structures - just as all patients with a "perceptual" disorder naturally produce content-inadequate messages as a result of it, which can act as difficulties with "expression"). Currently, the dichotomous division of aphasia into fluent and non-fluent type and within it into subtypes according to the so-called **Boston classification is the most widely used in world aphasiology. For a clearer idea of the current division of aphasias, we present the Boston classification in Table 2. However, knowledge of the dichotomous division is sufficient for a doctor's normal clinical practice.**

Boston Classification of Aphasias

Old division of aphasias	Boston Classification of Aphasias	Lesion	Spontaneous speech	Understanding	Repetition	Naming	Writing	Reading aloud
Expressive - motor	Broca's	<ul style="list-style-type: none"> ▪ Obl. Broc's area + obl. before and after it (lesions of the frontal and frontoparietal operculum) ▪ Obl. Insula and parietal supramarginal gyrus. lobe ▪ Subcortical. obl. frontal lobe 	Nonfluent	+	-	-	-	+ -
	Transcortical motor	<ul style="list-style-type: none"> ▪ Obl. ACA river bed, i.e. in front of Broc's area and near the supplementary motor area 	Nonfluent	+	+	-	-	+
Perceptual - sensory	Wernicke's	<ul style="list-style-type: none"> ▪ Temporal. lobe - Wernicke's area + obl. adjacent to it 	Fluent	-	-	-	-	-
	Transcortical sensory	<ul style="list-style-type: none"> ▪ Temporo-parietal (and temporo-occipital) border, it can be the ACP basin 	Fluent	-	+	-	-	+
	Conductive	<ul style="list-style-type: none"> ▪ Obl. arcuate fasciculus, supramarginal gyrus 	Fluent	+	-	-	-	+ -
	Anomic	<ul style="list-style-type: none"> ▪ It has no localization value 	Fluent but difficulty recalling words	+	+	-	+	+
Mixed	Global	<ul style="list-style-type: none"> ▪ Extensive lesion dominant hem. (ACM watershed) 	Nonfluent to mute	-	-	-	-	-
	Mixed transcortical	<ul style="list-style-type: none"> ▪ Isolation of the speech cortex from surrounding areas ▪ Extensive lesion of the dominant hemisphere, lesion of the fronto-temporo-parietal region, or temporo-occipital regions ▪ Broca's and Wernicke's areas themselves are not affected 	Nonfluent	-	+	-	-	-

Explanations: + relatively preserved, - disturbed.

Differential diagnosis

The doctor's task at the first contact with a neurologically ill patient with a communication disorder is not to classify possible aphasia in more detail, but to diagnose it in general and differentiate it from other possible communication disorders (see differential diagnosis in Table 3).

Differential diagnosis of dementia x aphasia x dysarthria x oral (bucofacial) apraxia x speech apraxia

	Dementia of the Alzheimer type	Aphasia	Dysarthria	Oral apraxia	Apraxia of speech
The emergence and course of difficulties	progressive deterioration	sudden onset	sudden onset	sudden onset	sudden onset
Articulation errors	No	non-constant	constant	No	non-constant
Paraphasia	No (occurrence only in later stages)	Yes	No	No	No
Comprehension disorder	Yes	Yes	No	No	No
Anomie	Yes	Yes	No	No	No
Agrammatisms	No (occurrence only in later stages)	Yes	No	No	No
Alexia	partly (reading aloud for a long time without being noticeable, reading with comprehension is difficult)	Yes	No	No	No
Agraphia	Yes (especially in later stages)	Yes	No	No	No
Disorders of reflexive - non-speech activities (chewing, swallowing...)	No (occurrence only in later stages)	It does not have to be	Yes	No	No
Disorder of respiration, phonation, nasal resonance	No (occurrence only in later stages)	No	Yes	No	No
Social behavior	disproportionately	adequately	adequately	adequately	adequately
Disorientation by place, time, person	Yes	No (can be in the acute stage)	No	No	No
Preview	No (only in initial stages yes)	mostly yes	Yes	Yes	Yes

Note: disorders can be combined with each other, relatively common is a combination of aphasia and dysarthria, nonfluent aphasia and speech apraxia, aphasia and dementia...

Investigation

For the correct diagnosis of aphasia, it is important to evaluate **the patient's speech in the following areas** at least as a guide (for more details, guide examination in Table 4.)

Spontaneous speech production - we evaluate the fluency, informational value of the message, we notice whether the patient's speech does not contain stereotypies, anomia, circumlocution, paraphasia, ... (symptoms of aphasia in Table 1.).

Naming - impaired naming ability is typical for aphasic patients. If the patient does not have a naming disorder, it is necessary to consider other disorders of speech communication, such as speech apraxia or dysarthria (see table 3.). However, the impaired ability to name without a simultaneous, albeit discrete, disability in the other areas listed below is nevertheless not a reason for establishing a diagnosis of aphasia. An isolated naming disorder can be a symptom of the initial stage of the dementia syndrome, but also a symptom of the patient's depression or apathy (see Table 3).

Comprehension - the correct assessment of the patient's ability to understand is not only important for the approximate localization of brain damage in the anterior or posterior cortical area, but also for the course of further communication and treatment with the patient (e.g. the patient cannot be given informed consent to sign if he has a significant impairment of understanding, which, in addition, usually correlates with reading comprehension disorder!).

Repetition - unlike the above areas, repetition may not be impaired in all types of phatic disorders. However, for Broca's, Wernicke's, global and especially for conduction aphasia, impairment of the ability to repeat is typical (see Table 2). We notice not only the accuracy of repetition, but also articulation errors, phonemic paraphasias...

Writing - in most aphasics, writing is impaired to a greater or lesser extent, manifested by substitutions of letters (paragraphs), omission of words, perseverations of words, slippage of words or even the production of completely meaningless words. In the most severe cases, the patient only produces meaningless dashes. Acquired writing disorder (agraphia) can occur in isolation, but very often occurs in conjunction with aphasia.

Reading - is impaired in a large part of aphasics. If reading is not formally impaired, so-called reading comprehension is often impaired (the patient does not assign meaning to the word read, is unable to reproduce the exact content of the read text, answers questions related to the text inaccurately). A reading disorder (alexia) can also occur in isolation without a phatic disorder. Examination of the ability to read aloud with comprehension is essential for the differential diagnosis of pure Wernicke's aphasia and so-called pure verbal deafness. In the first case, reading comprehension is significantly impaired, in the second it is preserved.

Orientation examination of phatic functions

The investigated area	Difficulty of the task		
	easy	moderately difficult	difficult
<ul style="list-style-type: none"> Spontaneous speech production <p>Disorders of spontaneous speech production, see video 1 and 2 .</p>	<ul style="list-style-type: none"> "What is your name?" "Where do you live?" "Where are you now?" "What's your trouble?" 	–	–
<ul style="list-style-type: none"> Naming <p>See video 5 for naming errors .</p>	<ul style="list-style-type: none"> "What is it?" <p>We present real objects for naming, point to parts of the body, etc.</p>	–	<ul style="list-style-type: none"> "Name as many animals as possible in a minute!" <p>Performance below 20 is substandard.</p>
<ul style="list-style-type: none"> Understanding <p>(During the examination, watch out for possible limb apraxia, neglect syndrome! We do not tell! You cannot, for example, ask the patient to give us a hand and give him your hand at the same time.)</p> <p>For comprehension disorders, see video 3 and 4 .</p>	<ul style="list-style-type: none"> "Show...!" <p>We name objects around the patient, parts of the body, etc. (If, due to limb apraxia, the patient is unable to perform the intended hand movement towards the object, we ask him to look at the named object.)</p> <ul style="list-style-type: none"> "Raise your hand!" "Close your eyes!" "Stick out your tongue!" 	<ul style="list-style-type: none"> "Is your name XY?" "Are we home now?" "Do you have blonde hair?" "Am I a man?" "Can it snow in August?" "Does the bread opener cut?" <p>The patient answers yes/no, or by nodding the head or an agreed gesture.</p>	<ul style="list-style-type: none"> "Show your right ear with your left hand!" "Show the door first, then the table, and finally the chair." "After you touch your nose, touch your mouth and chin!" "If there's a small child in this room, raise your hand!" "Don't touch the ear, but touch the nose or belly."
<ul style="list-style-type: none"> Repetition <p>Replay failures see video 9 and 10 .</p>	<ul style="list-style-type: none"> "Repeat after me!" (sounds, syllables, words) 	<ul style="list-style-type: none"> "Repeat after me!" (sentences) 	<ul style="list-style-type: none"> "Repeat after me!" (sentence)
<ul style="list-style-type: none"> Writing <p>Typing error see video 11 and 12 .</p>	<ul style="list-style-type: none"> "Sign yourself!" "Write your address!" 	<ul style="list-style-type: none"> "Write!" <p>We dictate syllables, words, sentences.</p> <ul style="list-style-type: none"> "Write what it is!" <p>We present subjects.</p>	<ul style="list-style-type: none"> "Write the text on a postcard that you would send to your family from vacation!"
<ul style="list-style-type: none"> Reading <p>Reading disorder see video 13 and 14 .</p>	<ul style="list-style-type: none"> "Read aloud and do what it says!" <p>We present text like: Raise your hand., Close your eyes., Point to the table and to the window., If there is a chair in this room, bang on the table!</p>	–	<ul style="list-style-type: none"> "Read this article aloud to me and tell me what it's about!" (newspaper article, etc.) <p>(If the patient is unable to narrate on his own due to severely impaired expression, we ask him questions about the text.)</p>

Note: If the patient already fails to comply with the easy task of the examined area, it is not necessary, for reasons of time, to examine the patient with more demanding tasks.

