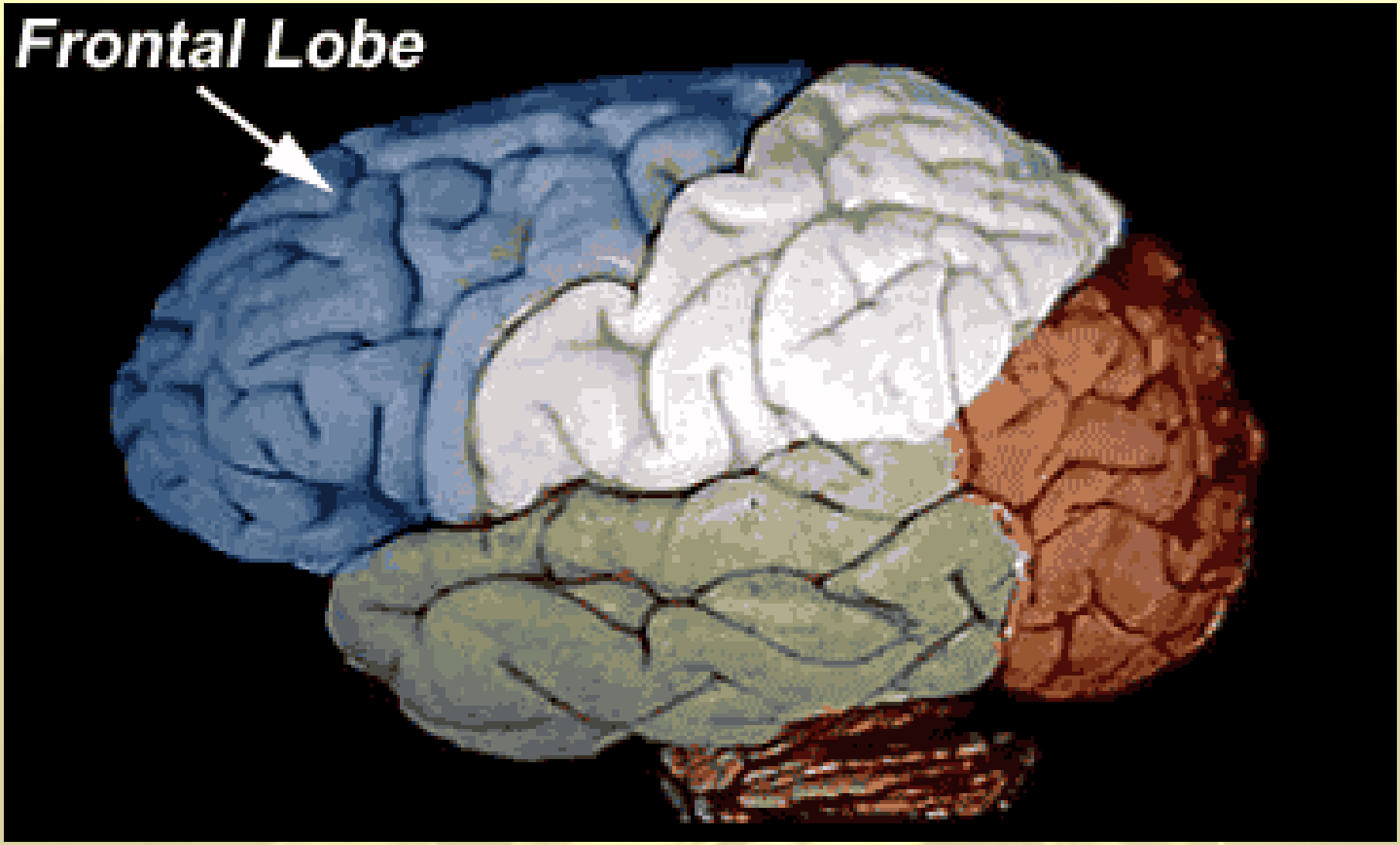
Prof. Leila Rinatovna Akhmadeeva
Ufa, Sep 8, 2022

MAIN CORTICAL FUNCTIONS

ЛОБНАЯ ТЕМЕННАЯ



ВИСОЧНАЯ ЗАТЫЛОЧНАЯ

MENTAL STATUS EXAMINATION

Whenever possible, mental status examinations should be conducted in a quiet room, without distractions. This may be difficult in busy hospital or clinic settings. Mental status examinations can be used to evaluate the following domains:

- Level of consciousness (arousal)
- Attention and concentration
- Memory
- Language
- Visuospatial perception
- Praxis
- Calculations
- Executive functioning
- Mood and thought content

Plan

Function	*Impairment*
Speech	**Aphasia**
Praxis	**Apraxia**
Gnosis	**Agnosia**
Memory	**Amnesia**

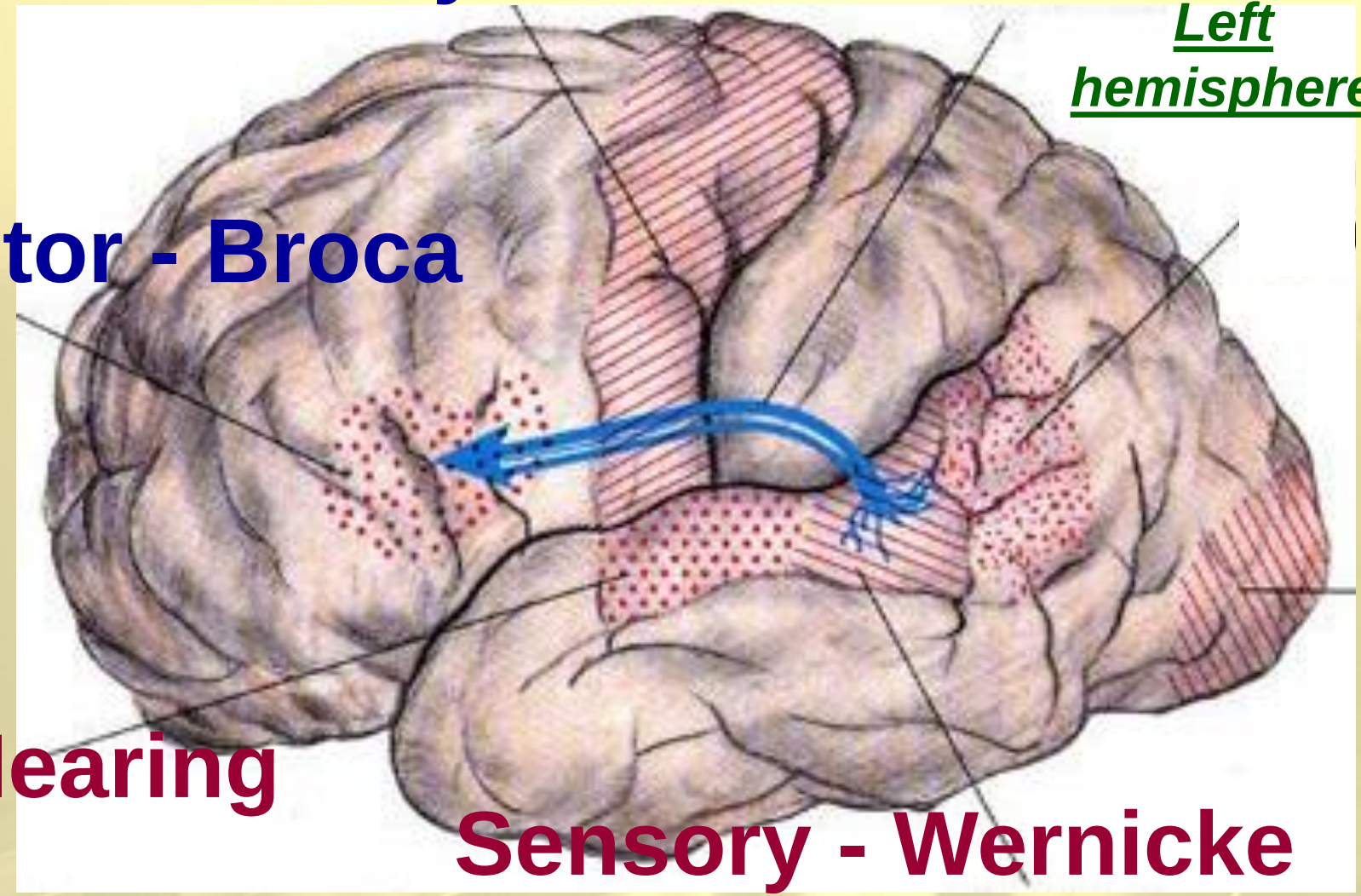
Speech/ language

- **Motor**
  - ***–(expressive)***
- **Sensory**
  - ***–(impressive)***

Video-patients

Speech

Voluntary movements



Центр Брока

Brodmann area 44

Центр Вернике

Brodmann area 22

The angular gyrus in the inferior parietal lobule is adjacent to visual receptive areas and subserves the perception of written language, as well as other language-processing functions

Approach to the patient with aphasia

Definition – Aphasia is the loss of ability to produce and/or understand written and/or spoken language.

Etiologies

– Ischemic stroke is the most common cause of aphasia; however, any structural brain pathology and certain neurodegenerative conditions can also produce aphasia.

Syndromes

Aphasias are classified into specific syndromes according to observed deficits in fluency, content, repetition, naming, comprehension, reading, and writing (table 1). These syndromes have been associated in many cases with a specific neuroanatomic localization.

Aphasia syndromes

Syndrome	Flu	Rep	Comp	Read	Write	Localization
Broca	-	-	+	+	-	"Broca" area: left inferior frontal, often anterior MCA branch occlusion
Wernicke	+	-	-	-	-	"Wernicke" area: left superior temporal and inferior parietal region, often posterior MCA branch occlusion
Anomic	+	+	+	±	±	Temporal, parietal, and occipital regions of cortex outside of classical language areas
Conduction	+	-	+	+	±	Superior temporal gyrus, inferior parietal region adjacent to temporal lobe; classically in arcuate fasciculus
Transcortical motor	-	+	+	+	-	Left mesial frontal, especially supplementary motor area; anterior cerebral artery occlusion
Transcortical sensory	+	+	-	-	-	Left posterior watershed zone between MCA and PCA territories
Transcortical mixed	-	+	-	-	-	Anterior and posterior watershed zones, effectively disconnecting perisylvian cortex from other cortical regions
Global	-	-	-	-	-	Large MCA or left carotid inclusions infarcting a vast region of the left hemisphere
Pure word deafness	+	+	-	+	+	Left or bilateral superior temporal gyrus lesions
Pure alexia	+	+	+	-	+	Left occipital lobe with involvement of splenium of corpus callosum
Aphemia	-	+	+	+	+	Motor cortex outflow to articulators
Pure agraphia	+	+	+	+	-	Left inferior frontal region

Flu: fluency; Rep: repetition; Comp: comprehension; Read: reading; Write: writing; +: relatively spared; -: impaired; MCA: middle cerebral artery; PCA: posterior cerebral artery.

Data from: Mendez MF, Clark DG. Neuropsychiatric aspects of aphasia and related disorders. In: The American Psychiatric Publishing Textbook of Neuropsychiatry and Behavioral Neurosciences, 5th ed, Yudofsky SC, Hales RH (Eds), American Psychiatric Publishing, Washington, DC 2007. p.522.

Differential diagnosis

Aphasias may be confused clinically with delirium, as well as acute and chronic psychiatric conditions.

However, a careful clinical examination can usually distinguish these.

Evaluation

All patients with aphasia should have a neuroimaging study. The acuity of the presentation dictates the urgency of the testing.

Patients with episodic aphasia should be additionally evaluated for seizures and transient cerebral ischemia (TIA).

ПАЦИЕНТ А

- Возраст – 63 года
- Проснулся утром и обнаружил, что не может говорить. Все понимал. Объяснялся жестами. По дороге в больницу ослабела правая рука.

Video - patients

Language — Assessment of language functions involves both listening to the patient's spontaneous speech during the clinical interview and formal language testing, focusing on deficits in the following domains:

●Fluency – Spontaneous fluency is assessed by listening to the patient's speech, focusing on its rate, ease of production, and use of grammar.

Verbal fluency tasks, which are widely used in cognitive assessments, ask patients to generate as many words as possible within a specified time limit that fulfill specific rules [3,4,16]. While not specific for language function, such tests rapidly assess word knowledge and verbal executive function. Patients may perform differently on tests of category fluency (eg, animals) and letter fluency (eg, words beginning with the letter F). Cutoff scores of 12 for animals and 10 for F words are commonly employed in clinic settings. Category fluency is more sensitive to temporal lobe damage, while letter fluency is more sensitive to frontal lobe damage [20].

●Content – Language errors that can emerge during the examination include paraphasic errors (phonemic or semantic) and neologisms. Spontaneous speech in patients with a Wernicke aphasia (table 1) is often characterized by normal fluency but is relatively devoid of meaningful content.

●Repetition – Patients are asked to repeat phrases of increasing length and complexity.

●Naming – Patients are asked to name objects or pictures that are presented to them, beginning with words that are more frequently used and progressing to those that are less common. Within this task category, the Boston Naming Test [21] is the most commonly used [4]; an abbreviated version is included in the CERAD battery [17].

●Comprehension – Understanding of both written and oral language is evaluated by giving a sequence of commands, beginning with one-step, midline commands ("Close your eyes") and progressing to more complex multistep commands ("Point to ceiling, then to the door, then to the source of illumination in this room").

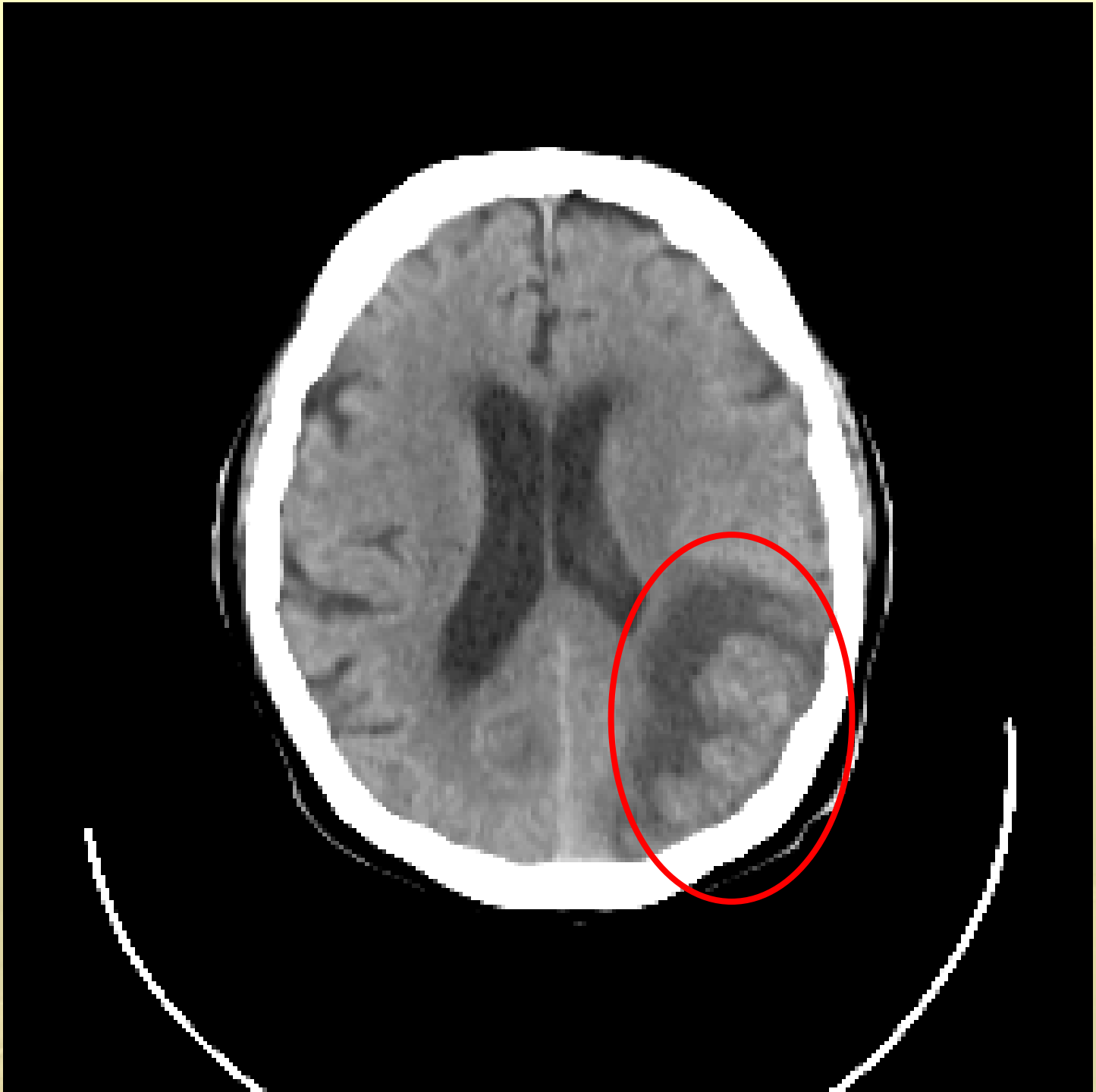
●Reading – Patients are asked to read aloud from a paragraph or a list of single words, including those with typical and atypical pronunciations.

●Writing – Patients are asked to spontaneously generate a written sentence.

Aphasia is the acquired inability to produce and/or understand written and spoken language. For patients, this may be an isolated finding or one feature of a larger pattern of cognitive impairment.

ПАЦИЕНТ В

- Возраст – 86 лет, страдает сахарным диабетом.
- Внезапно стал многословен, на вопросы отвечал не правильно, все время говорил на отвлеченные темы.

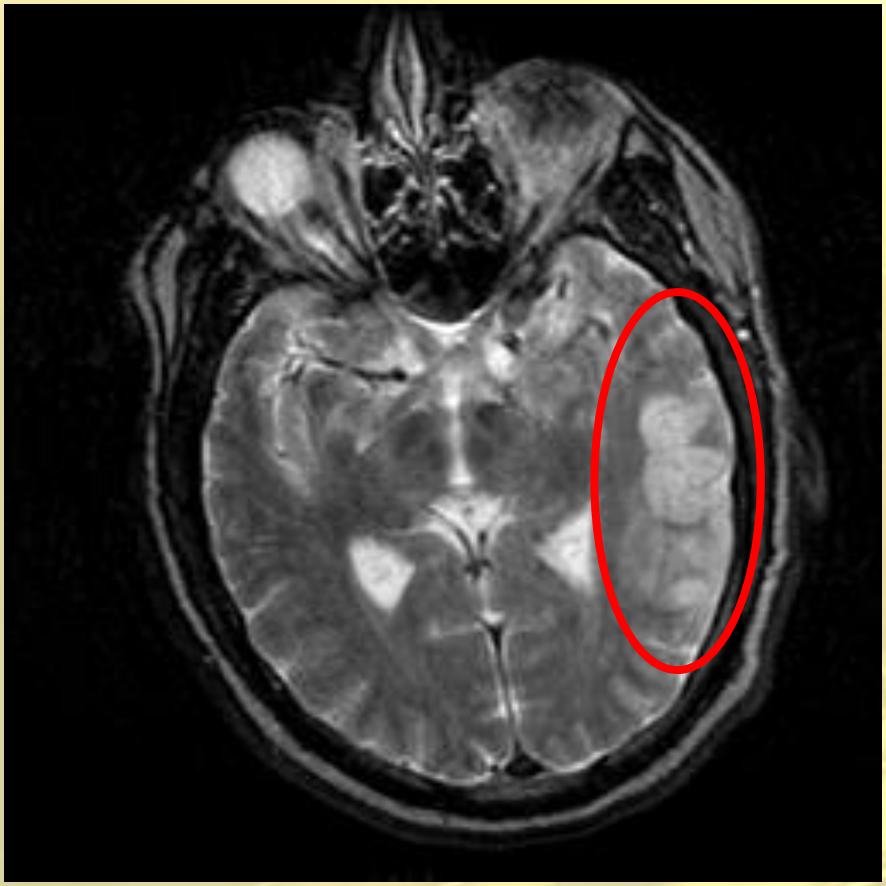


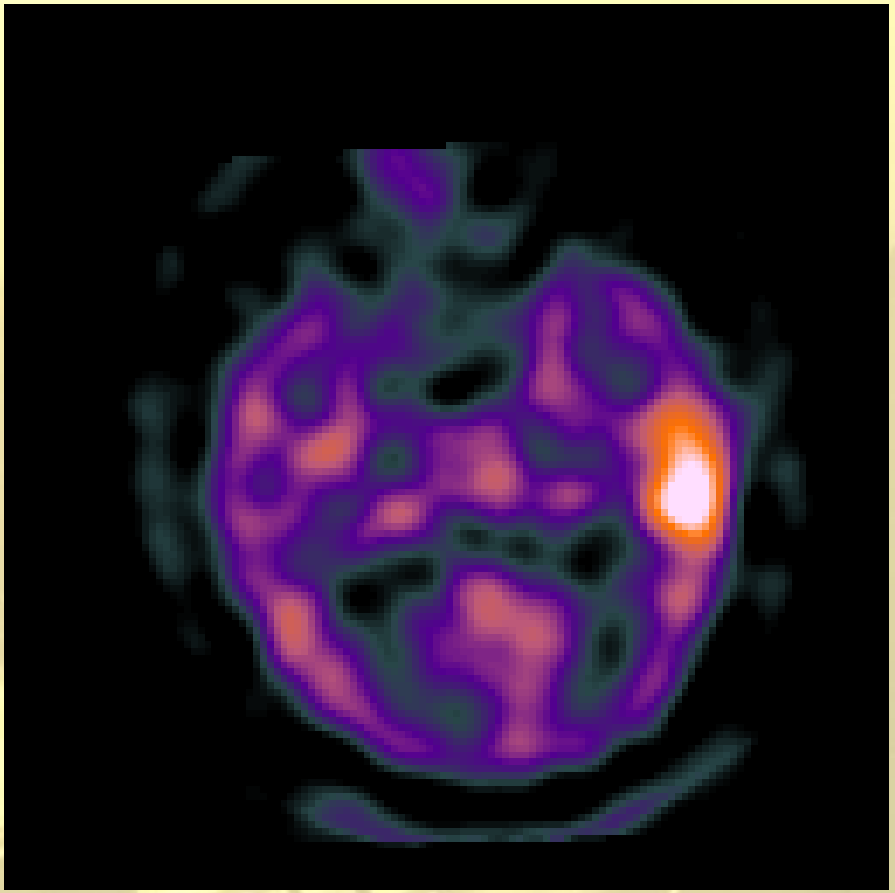
ПАЦИЕНТ С

- **Возраст – 48 лет, диагностирована гипертоническая болезнь, но лекарства не принимал.**
- **На работе внезапно перестал говорить и понимать окружающих.**

MPT

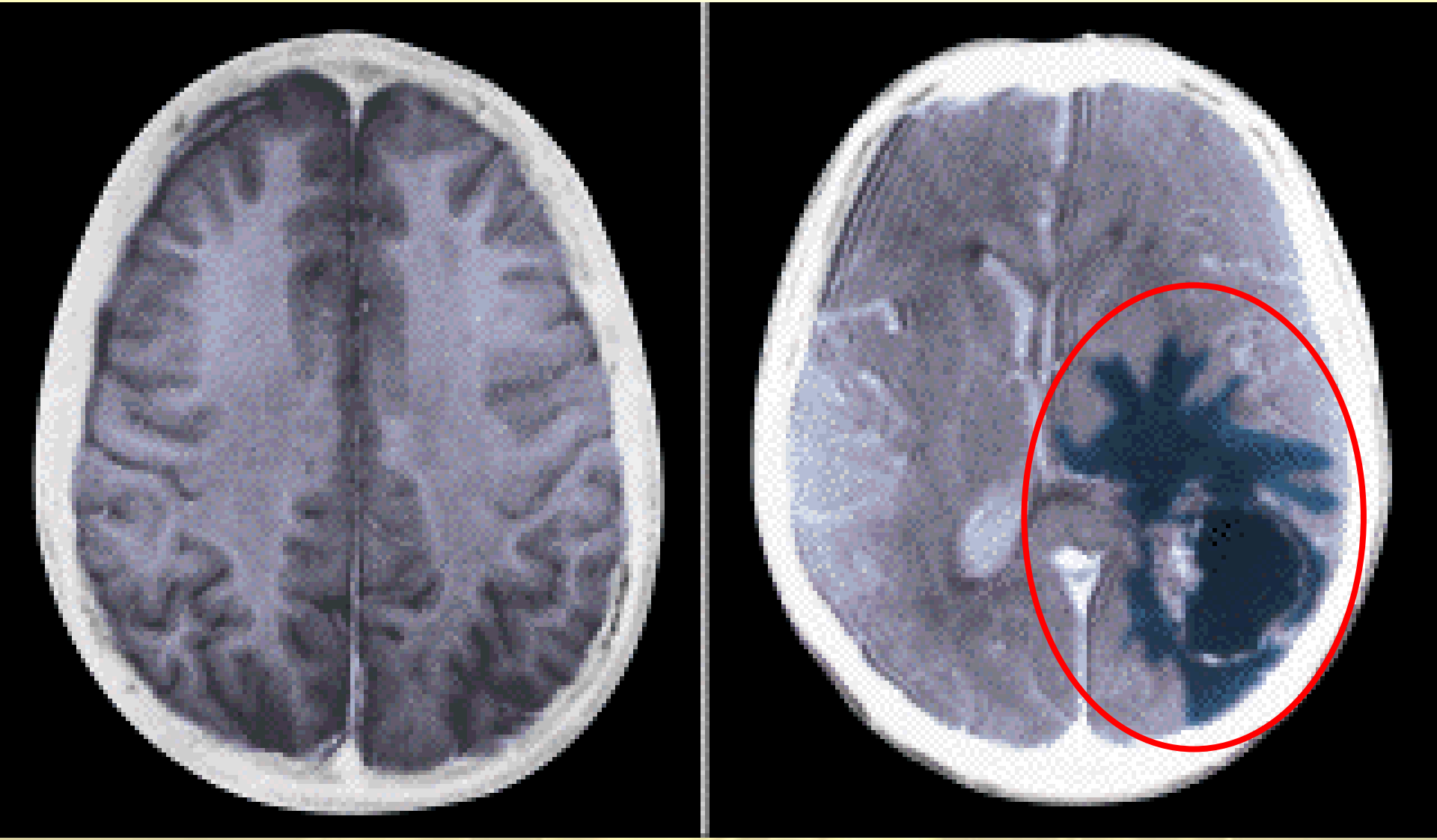
SPEC





ПРИЧИНА

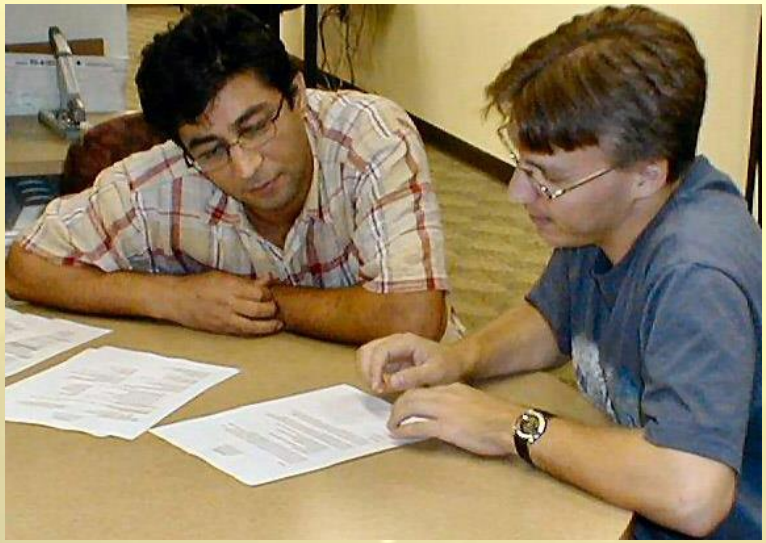
Чаще всего – обширный инсульт в бассейне СМА

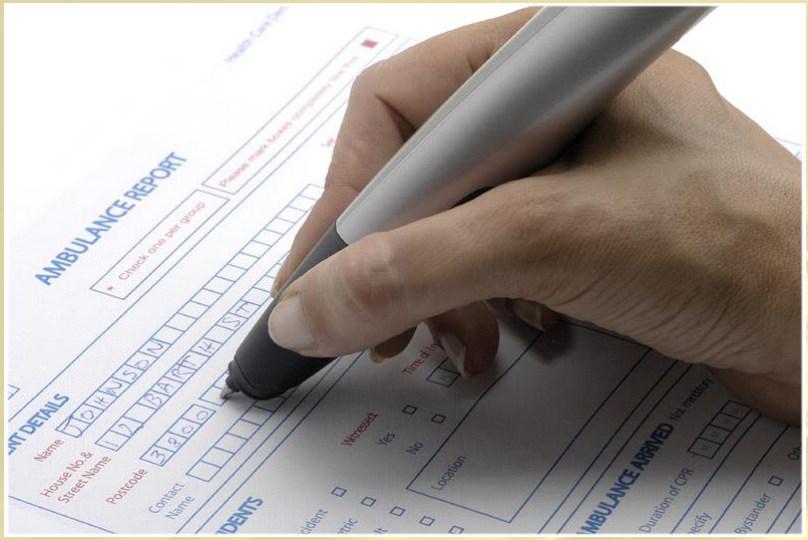


РЕЧЬ: ИССЛЕДОВАНИЕ

- **УСТНАЯ**
  - –Спонтанная
  - –Повторение
- **ПИСЬМЕННАЯ**
  - –Спонтанная
  - –Переписывание
  - –Письмо под диктовку

ИТАК! РЕЧЬ

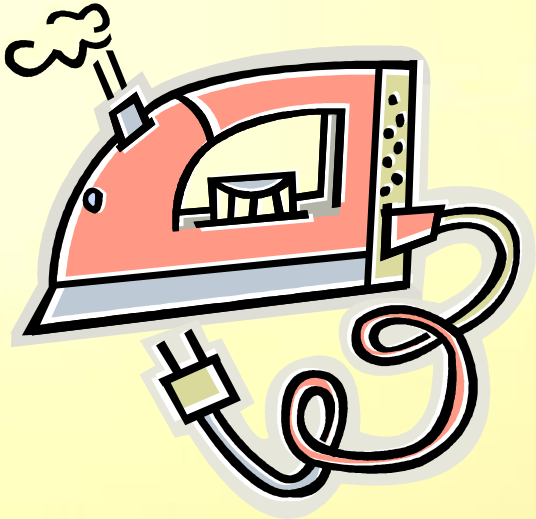



AMBULANCE REPORT
Check one per group
Name
House No. &
Street Name
Postcode
Contact
Name
Witness
Yes
No
Location
AMBULANCE ARRIVED
Duration of CPR
Bystander

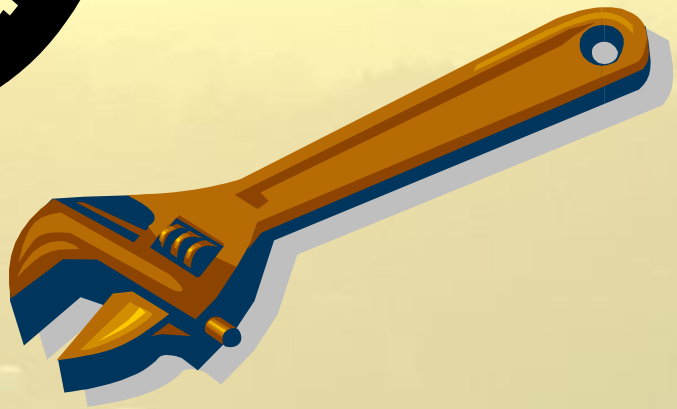

NO
PARKING

Video - patients

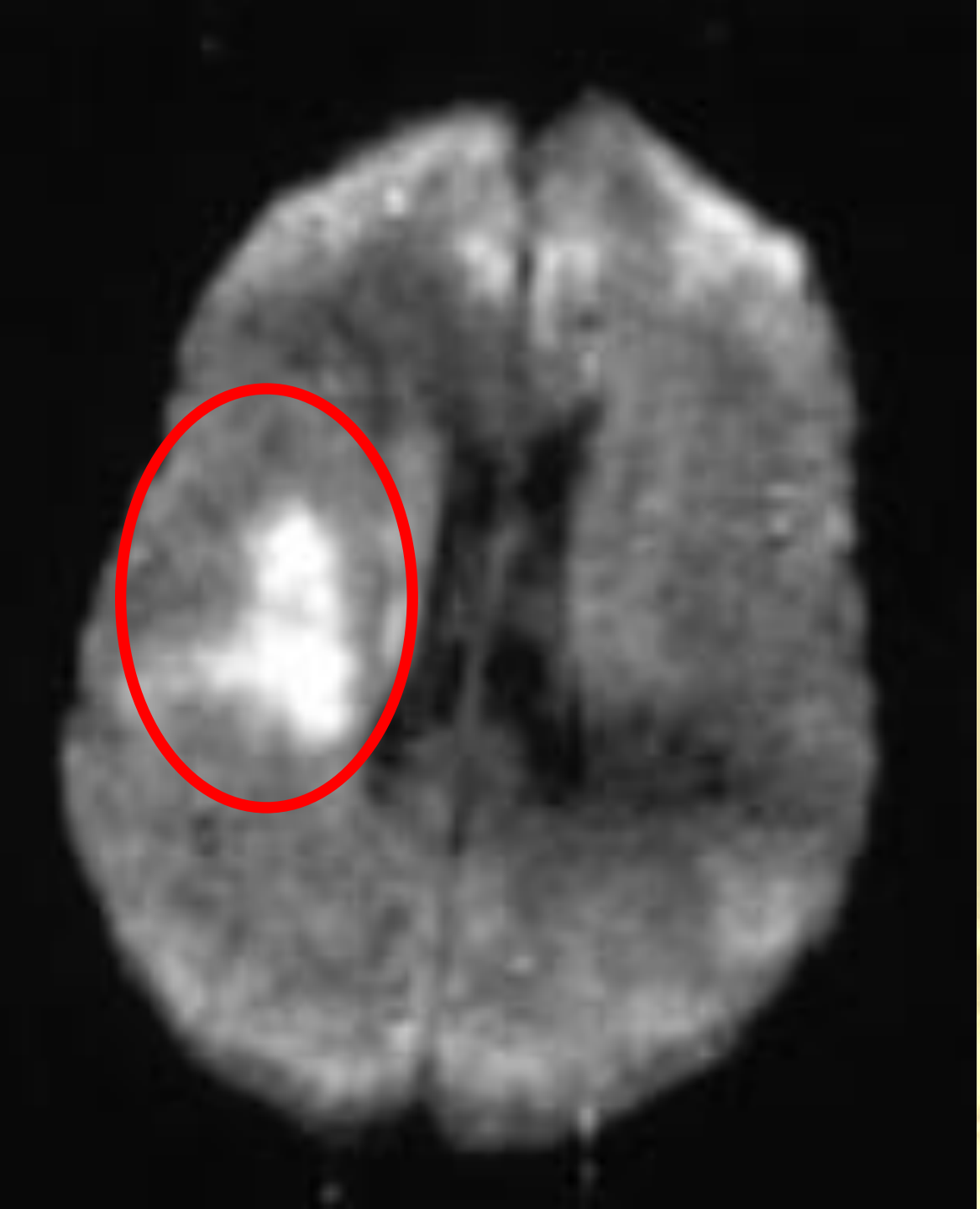
PRAXIS



- **ПРАКСИС**
  - **–Навыки**

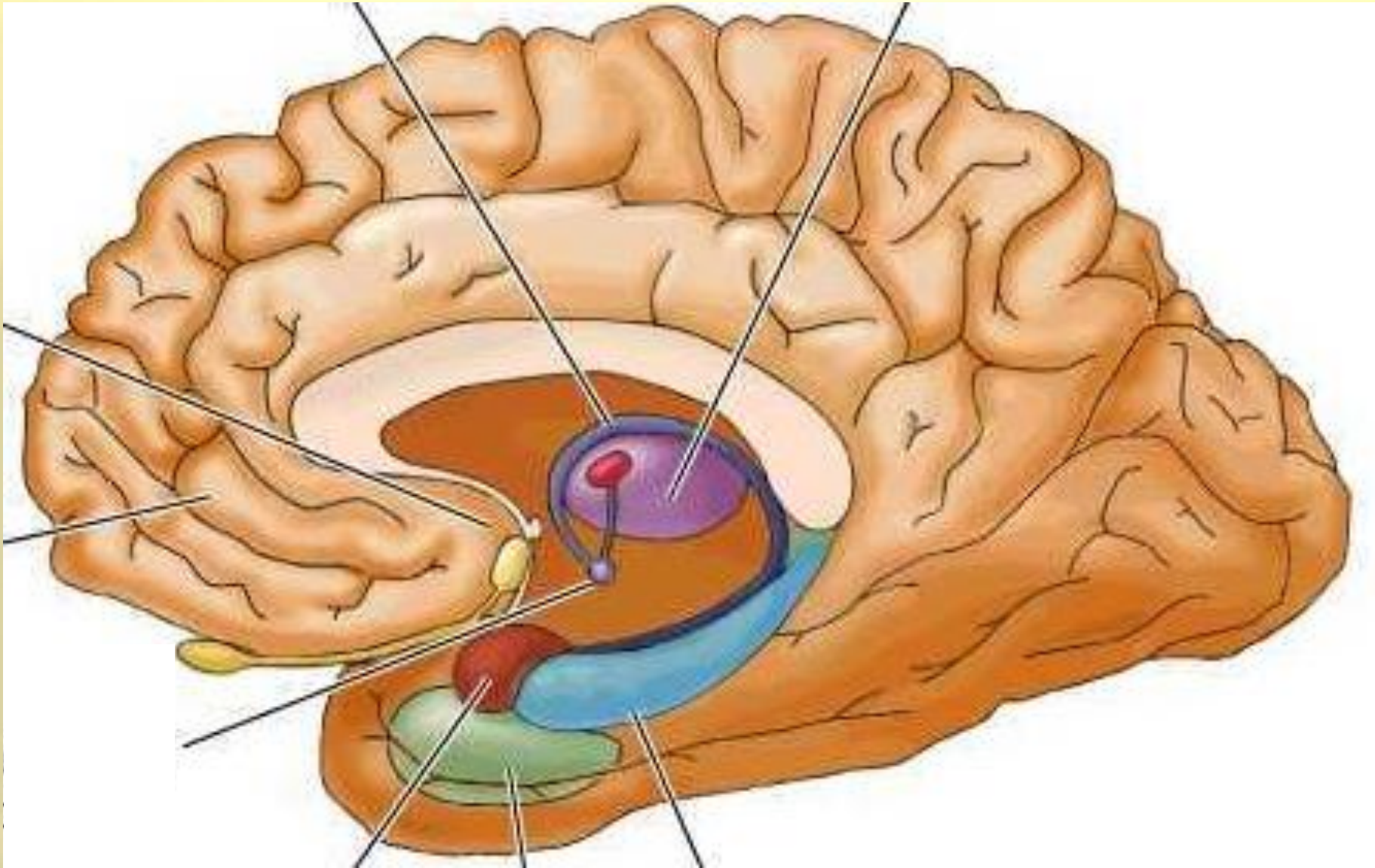


- **АПРАКСИИ**
  - **–Утрата навыков**



Повреждение **левого** полушария может дать гемипарез **справа** + **апраксию** «хорошей» левой руки из-за прерывания пути передачи импульса

Повреждение мозолистого тела тоже может дать апраксию



ПРАКСИС: ИССЛЕДОВАНИЕ

- **ДЕЙСТВИЯ С РЕЛАЬНЫМИ ПРЕДМЕТАМИ**
- **ДЕЙСТВИЯ С ВООБРАЖАЕМЫМИ ПРЕДМЕТАМИ**

Praxis

Praxis refers to the execution of learned motor movements in the absence of primary deficits in motor and spatial abilities [8,26]. Apraxia typically presents with difficulties dressing, feeding, and/or bathing that are not explained by clear motor deficits. These deficits should be considered independently of any concomitant difficulties with motor and/or language function.

- Ideomotor praxis (ie, the ability to perform learned motor movements) can be evaluated by asking the patient to perform increasingly complex motor tasks. The patient may be asked to demonstrate the use of an object (eg, comb, hammer, fork) with and without the actual object in their hands [8,27].
- Ideational praxis (ie, the ability to carry out a sequential set of actions toward a final goal) can be evaluated by asking the patient to perform a step-wise series of coordinated tasks, such as "Take this piece of paper, fold it in half, and place it in the envelope."

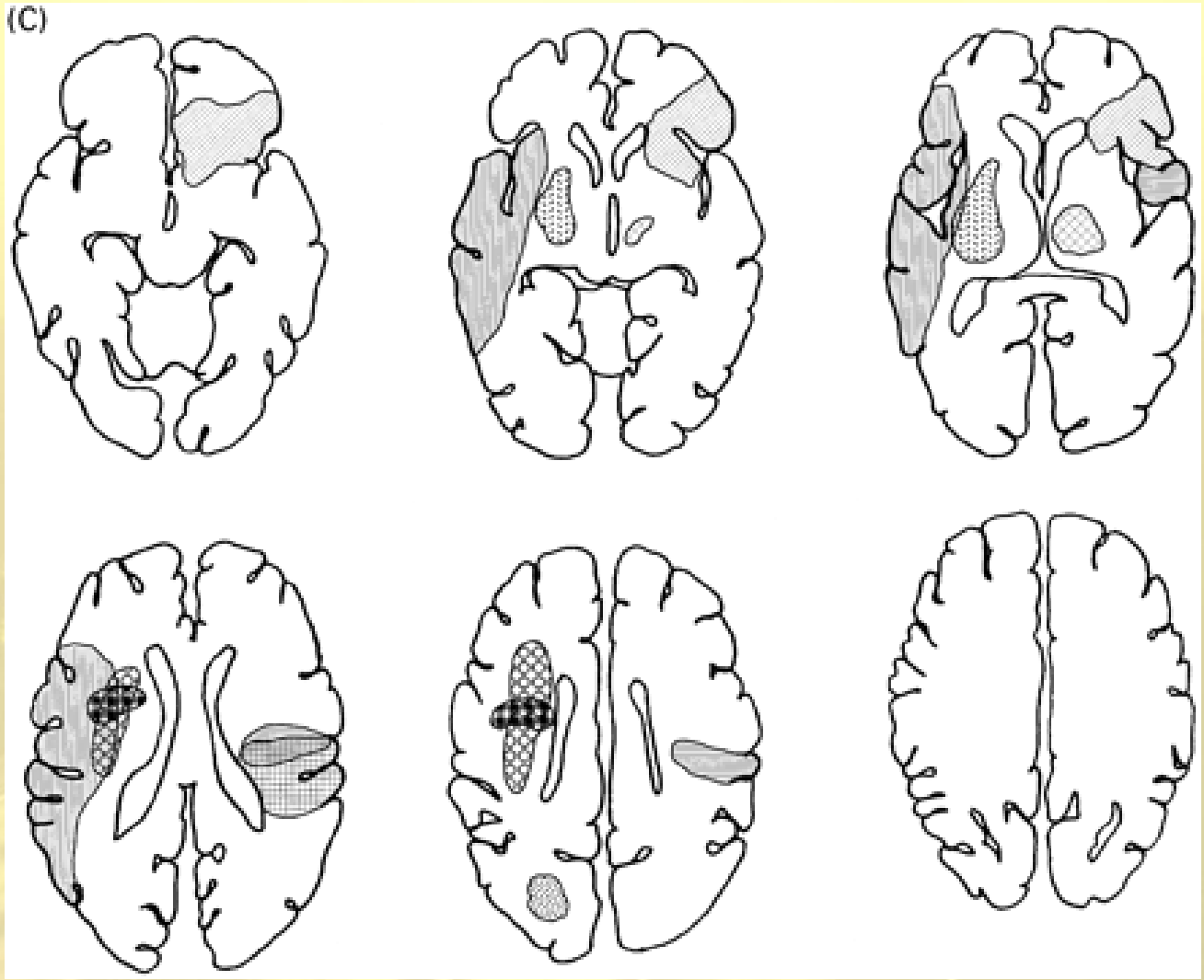
Common praxis errors include using the wrong object or body part to perform a task. Many patients who cannot perform motor tasks to command can do so spontaneously or by imitation.

Patients with neurodegenerative disease may also have difficulty performing a series of coordinated tasks. More specific or isolated problems with praxis suggest involvement of the dominant parietal lobe [27,28]. Ideomotor apraxia is a relatively prominent feature of corticobasal degeneration

Апраксии отдельных частей тела

- ***Апрасии лица*** **(Brain, Vol. 123, No. 11, 2213-2230, November 2000)**

Bizzozero с соавт.



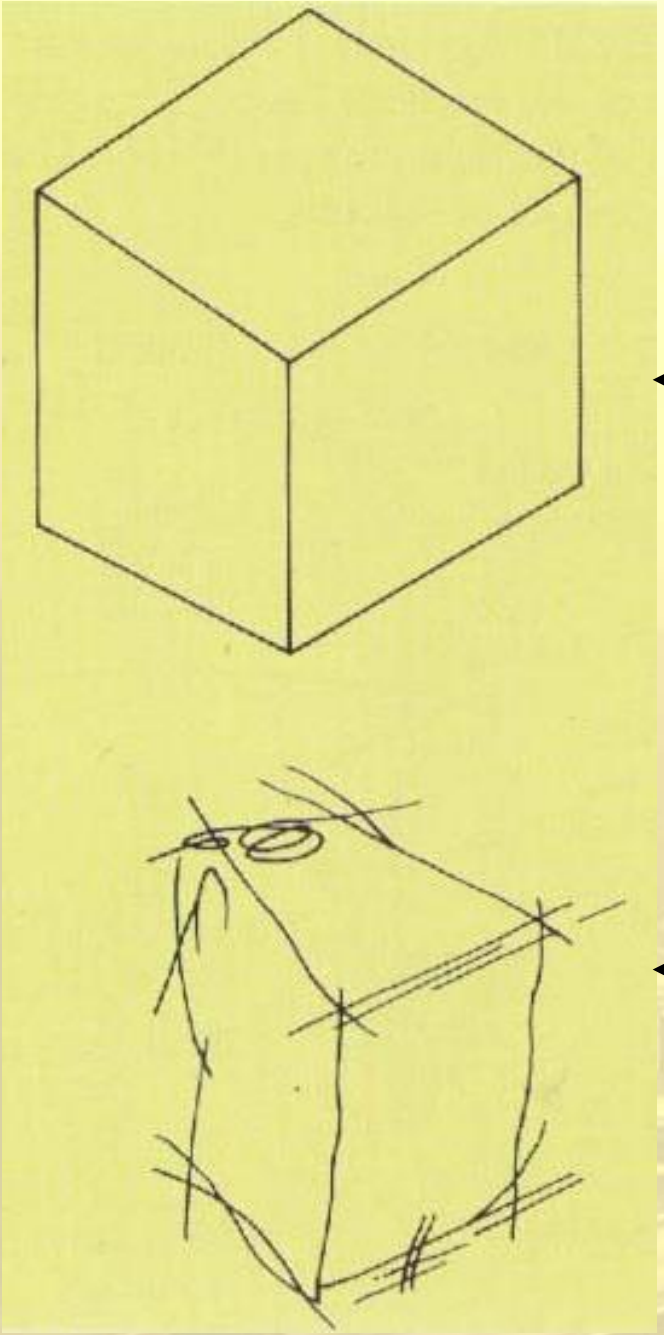


Рисунок врача

Конструктивная диспраксия

Рисунок пациента с диспраксией

GNOSIS

- **ГНОЗИС**
  - **–Узнавание**

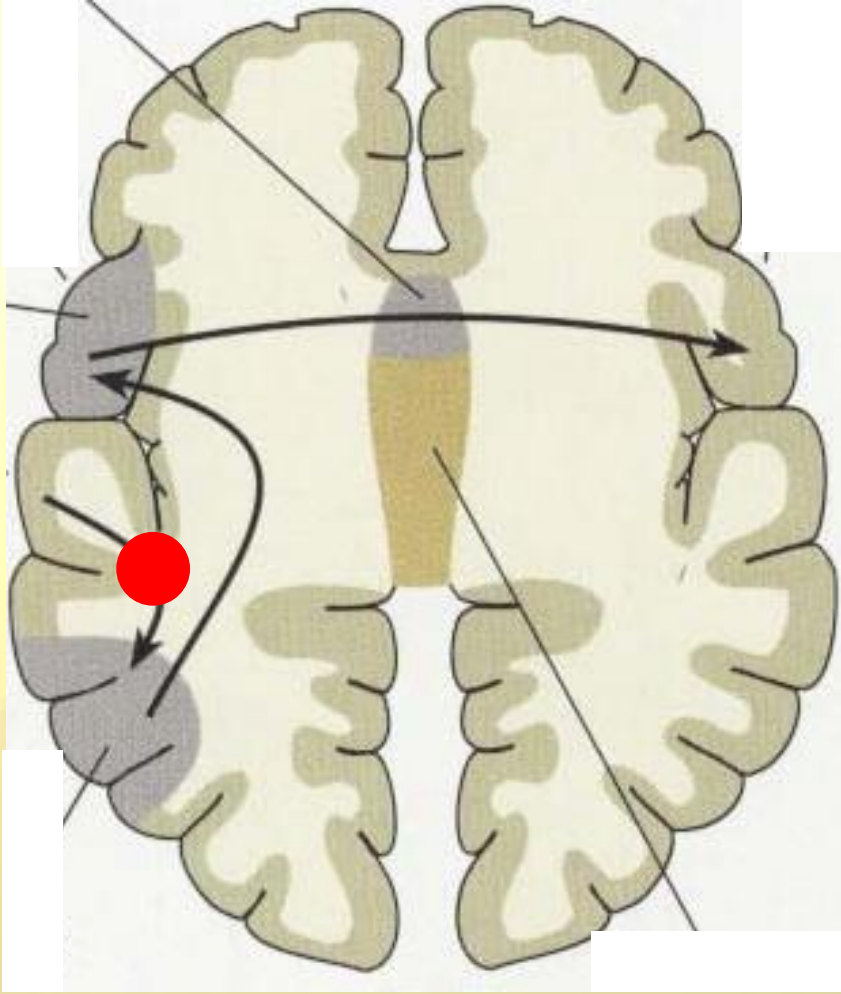
- **АГНОЗИИ**
  - **–Утрата узнавания**

ГНОЗИС

- Слуховой
- Зрительный
- Вкусовой
- Тактильный
- Обонятельный
- Стереогнозис

АГНОЗИИ

- Слуховые
  - –Вербальные (слова)
  - –Невербальные (шум воды, свист, звуки животных)
  - –Амузия (музыка)



Зрительная агнозия

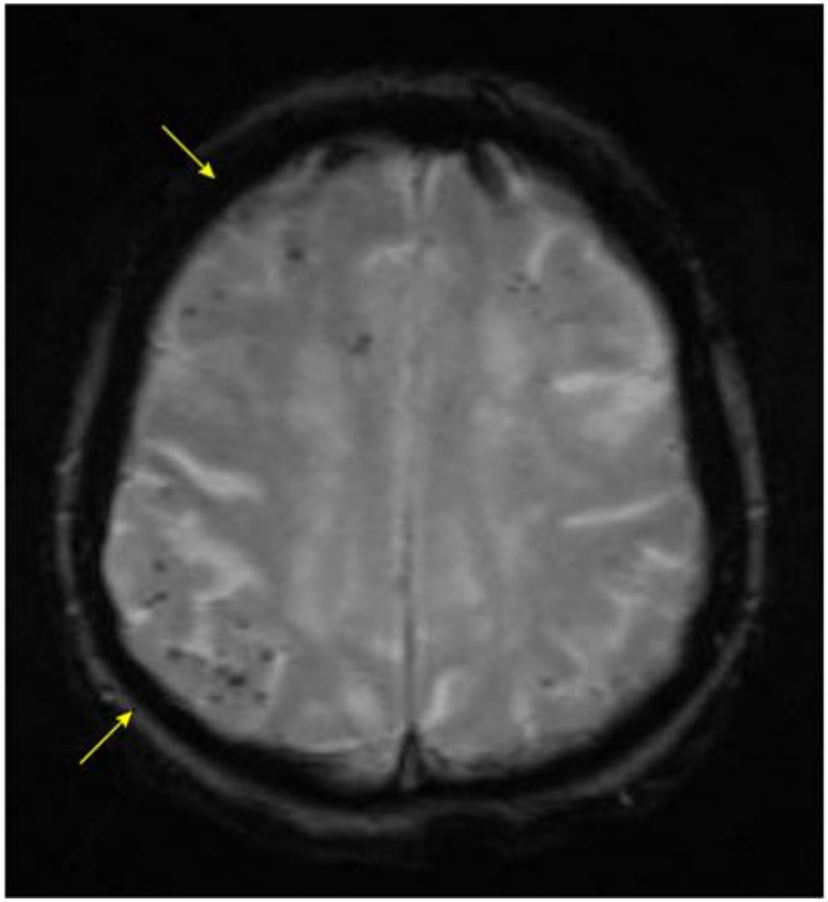
Evaluation of cognitive impairment and dementia

- Memory!!!

Dementia is a disorder that is characterized by a decline in cognition involving one or more cognitive domains (learning and memory, language, executive function, complex attention, perceptual-motor, social cognition) [1]. The deficits must represent a decline from previous level of function and be severe enough to interfere with daily function and independence. The most common form of dementia in older adults is Alzheimer disease (AD), accounting for 60 to 80 percent of cases.

- Mild cognitive impairment (MCI) is an intermediate clinical state between normal cognition and dementia. While specific subtle changes in cognition can occur in normal aging, MCI can also be a precursor to dementia [1]. At the same time, MCI may also represent a reversible condition in the setting of depression, as a complication of certain medications, or during the recovery from an acute illness.

Multiple cerebral microhemorrhages in a patient with amyloid angiopathy and Alzheimer disease



Gradient echo magnetic resonance imaging (MRI) showing multiple areas of punctate susceptibility artifact consistent with cerebral microhemorrhages (arrows) due to amyloid angiopathy in a patient with Alzheimer's disease.

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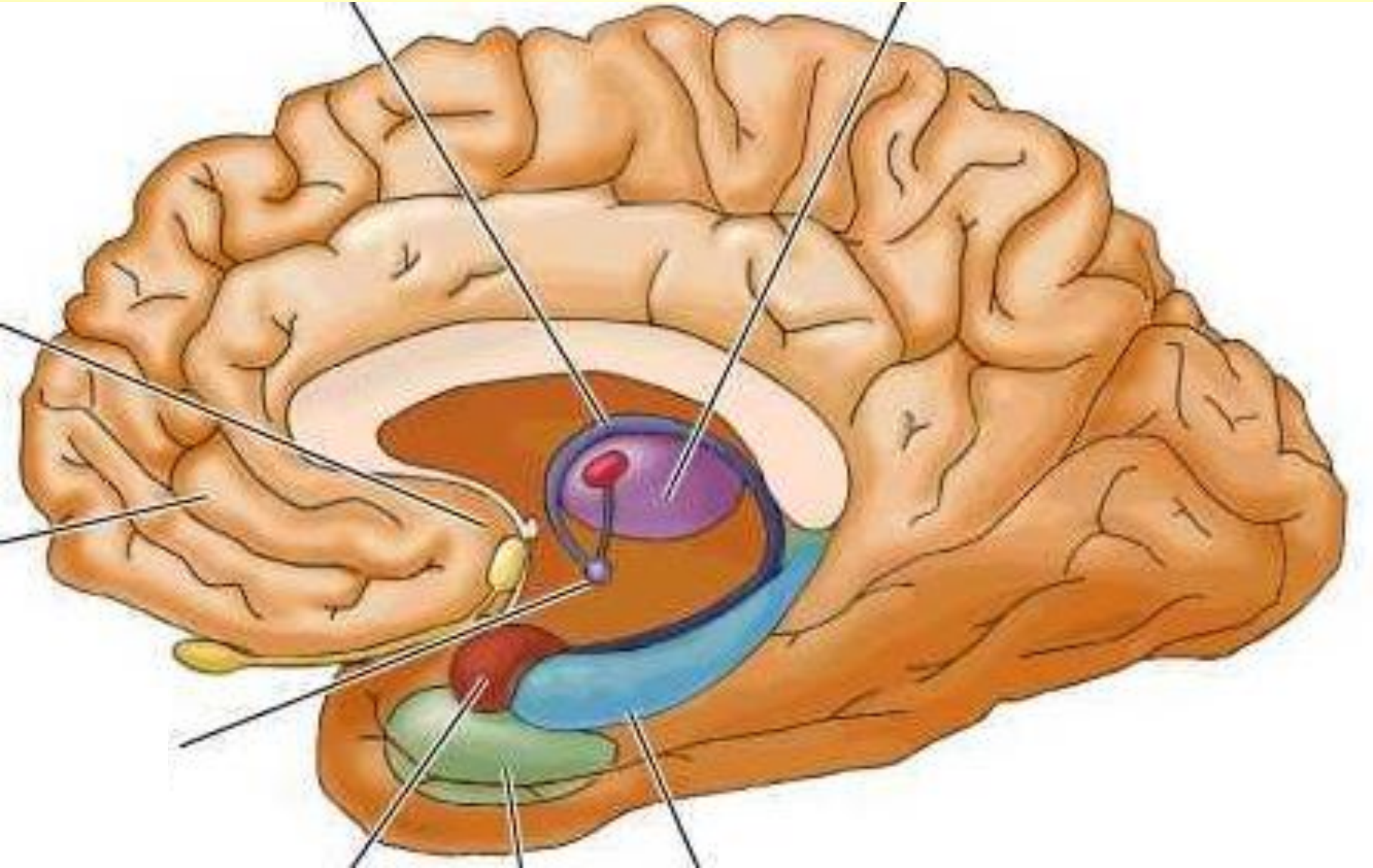
ПАМЯТЬ

1.КРАТКОВРЕМЕННАЯ
(на текущие события)
2.ДОЛГОВРЕМЕННАЯ

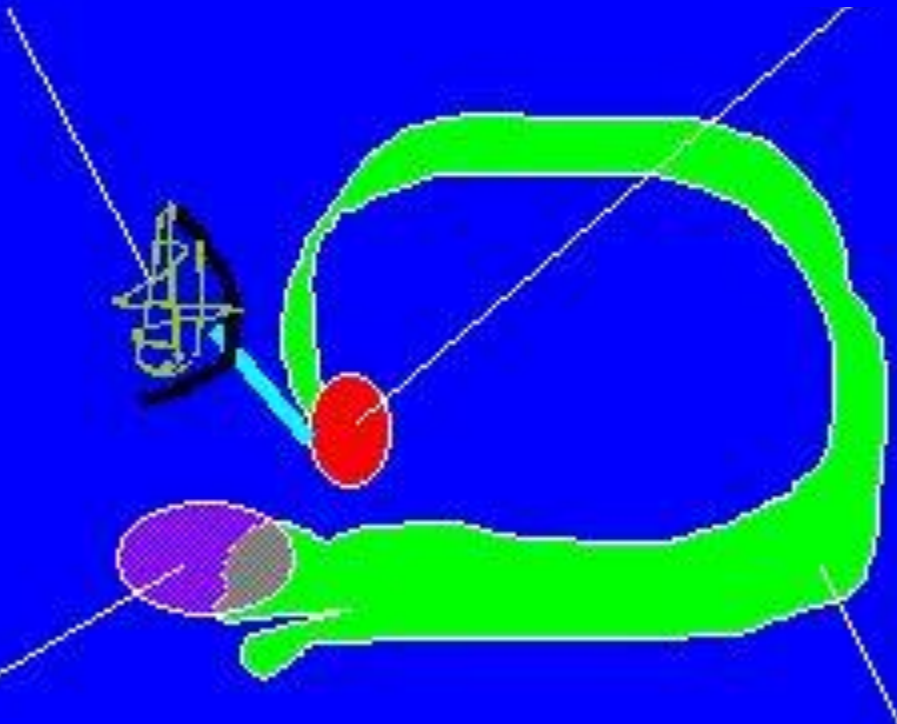
ПАМЯТЬ



ПАМЯТЬ

ЯДРА ЗРИТЕЛЬНОГО БУГРА

МАМИЛЛЯРНЫЕ ТЕЛЬЦА



МИНДАЛЕВИДНЫЙ КОМПЛЕКС

ГИППОКАМП

АМНЕЗИИ / ДИСМНЕЗИИ

- **АНТЕРОГРАДНЫЕ**

(пациент не может запомнить то, что происходит ПОСЛЕ события)

- **РЕТРОГРАДНЫЕ**

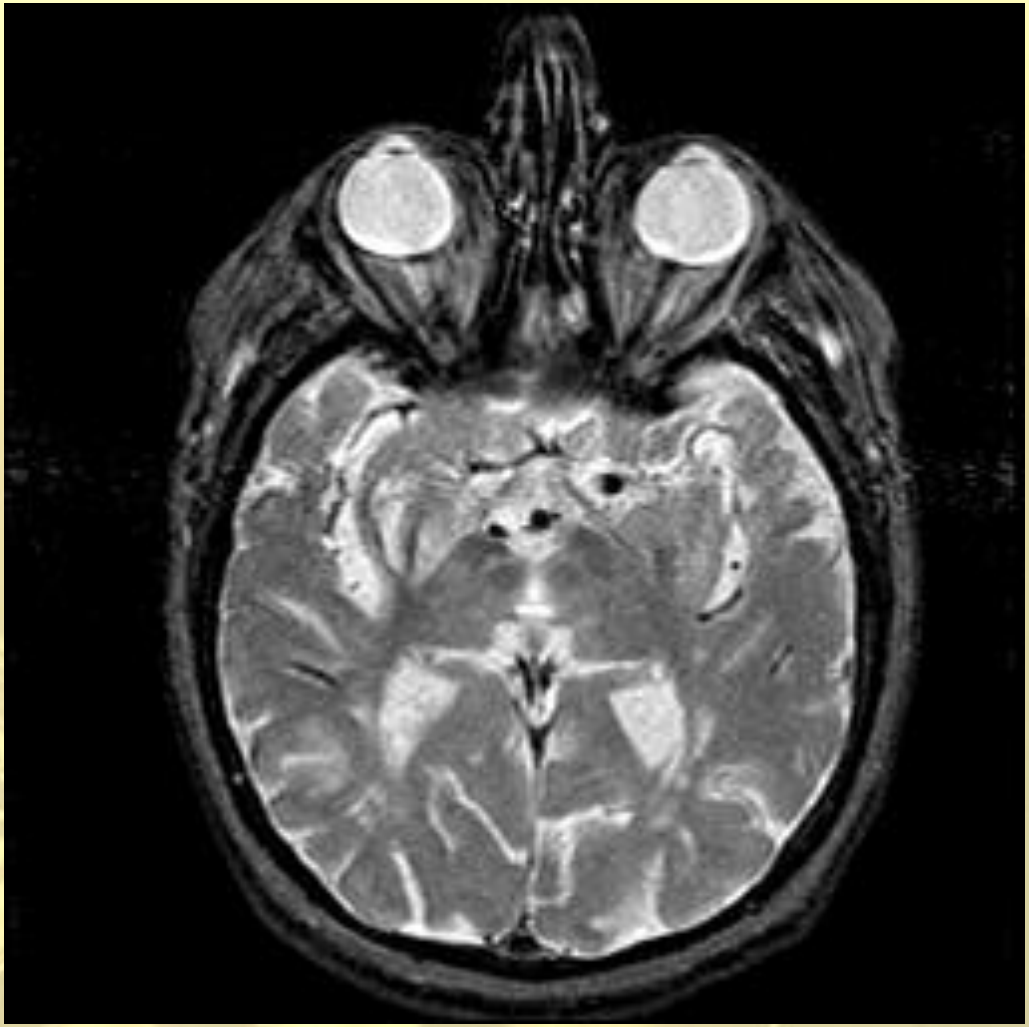
(пациент забывает что произошло ДО события)

АМНЕЗИЯ ВЕРНИКЕ-КОРСАКОВА

ПОРАЖЕНИЕ МАМИЛЛЯРНЫХ ТЕЛ И ТАЛАМУСА

↓

ТЯЖЕЛАЯ АНТЕРОГРАДНАЯ АМНЕЗИЯ



Cognitive testing — Patients with cognitive complaints should undergo a careful mental status examination. Cognitive and behavioral assessments are designed to distinguish normal and abnormal performance arising across a range of different conditions. They can be divided into three levels of rigor: screening tools such as the Mini-Mental State Examination (MMSE), an extended mental status examination, and formal neuropsychological testing. The scope of the evaluation should be guided by the complaints brought forward by the patient or family member.

The MMSE, Montreal Cognitive Assessment (MoCA), and other brief screening tests for dementia have a pooled sensitivity of 75 to 92 percent and a specificity of 81 to 91 percent [21]. Typically, these assess a broad range of cognitive domains but do not include an assessment of mood or thought content. These assessments are discussed in detail separately.

More detailed mental status testing is often warranted, for example, when the results from a screening assessment appear at odds with the history and when observed deficits are uncertain because of a language barrier, physical handicap, or level of education. An extended bedside evaluation of mental status is described separately. (See "The mental status examination in adults".)

Both altered mood and abnormal thought content have a strong impact on cognitive function; thus, such an assessment should always accompany a brief screening evaluation for dementia.

Regional atrophy patterns in neurodegenerative dementias

Dementia syndrome	Atrophy pattern
Alzheimer dementia	Temporal (including hippocampal), parietal, prefrontal atrophy, sparing sensorimotor strip and occiput
Behavioral variant frontotemporal dementia	Prefrontal, anterior temporal
Huntington disease	Head of the caudate
Nonfluent variant primary progressive aphasia	Dominant perisylvian
Posterior cortical atrophy	Bilateral superior parietal-occipital junction
Progressive supranuclear palsy	Diminished midbrain anteroposterior diameter
Semantic variant primary progressive aphasia	Dominant anterior temporal

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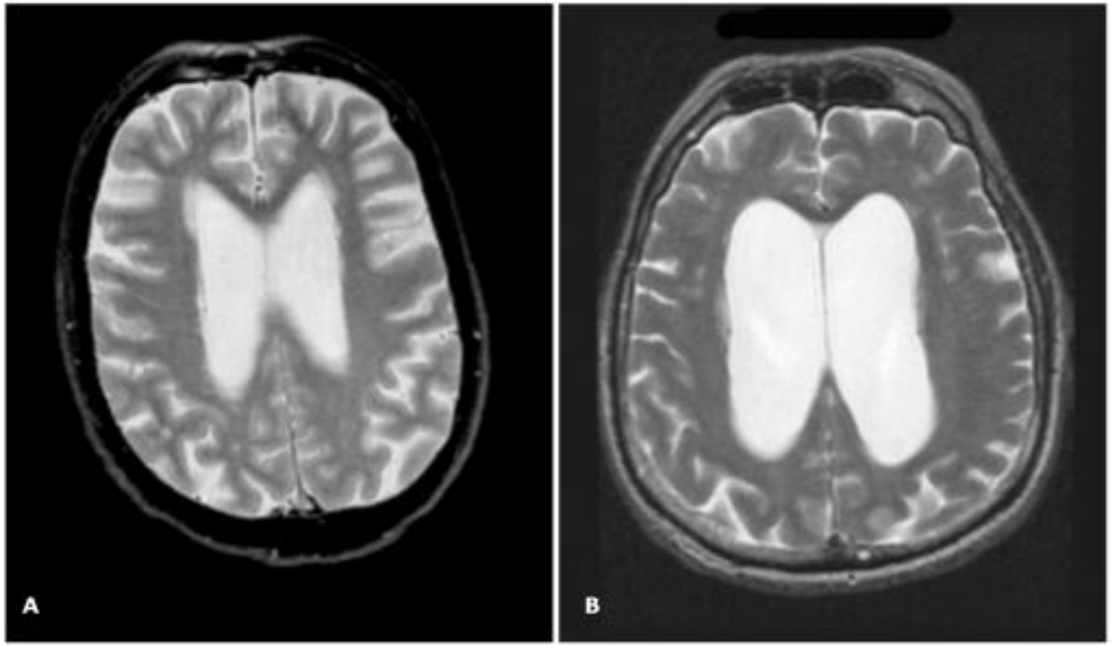
The diagnosis of dementia cannot be made solely on the basis of a low score on one of these assessments; these tests help to quantify the types and severity of impairment, but the most important part of the diagnostic evaluation is a detailed history including the perspective of an informant (eg, spouse or adult child), interviewed separately from the patient if possible. Agreement between the history and the mental status examination is strongly suggestive of the diagnosis of dementia. When the history suggests cognitive impairment but the mental status examination is normal, possible explanations include mild dementia, high intelligence or education, depression, or, rarely, misrepresentation on the part of the informants [22]. Conversely, when the mental status examination suggests cognitive impairment but the family and patient deny any problems, possible explanations include an acute confusional state, very low intelligence or education, or inadequate recognition by the family [22]. For some, the diagnosis of dementia is regarded as shameful, and reluctance to recognize or acknowledge the problem must be addressed.

Neuropsychological assessment (psychometric testing) may be useful in difficult situations; repeated clinical assessments over time (eg, 9 to 12 months) are often the most helpful tool.

MRI ventriculomegaly atrophy versus NPH



(A) Axial T2-weighted image at level of lateral ventricles in a patient with Alzheimer disease demonstrates increased size of the ventricular system in proportion to sulcal dilatation, consistent with brain parenchymal volume loss.

(B) Axial T2-weighted image at level of lateral ventricles in a patient with NPH shows ventricular dilatation out of proportion to the sulci.

MRI: magnetic resonance imaging; NPH: normal pressure hydrocephalus.

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