



The Tract
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The Mental Status Examination

A senior clinical guide

Consciousness · Attention · Language · Memory · Visuospatial · Executive · Praxis · Neglect

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About this guide

How to examine cognition at the bedside and turn the findings into a localisation: exact scripts, normal limits, what each failure points to, the aphasia matrix, screening tools, delirium, and testing in Arabic.

What changed. Version 2.0 rebuilds the earlier Najm Notes guide: arousal terms are no longer mapped to GCS bands, the cueing and memory pairings are corrected, screening instruments, delirium tools, Arabic adaptation, a documentation template and cases are added.

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A teaching reference, not a protocol. Doses and thresholds are given to aid recognition; check them against current local guidance and prescribing information before acting on them.

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Part I

Before you start

The hierarchy · The setting · Education and language · Testing in Arabic

The mental status examination is the part of the neurological examination most often done badly, because it is most often done as a checklist. Done well, it is a localising examination like any other: each failure points somewhere, and the pattern of failures points to a syndrome. This guide gives, for each domain, how to test it – with the words to use – what counts as normal, and what each failure means.

1.1 The hierarchy

Cognitive domains are not independent. They rest on each other in a fixed order, and a failure low in the hierarchy invalidates everything above it.

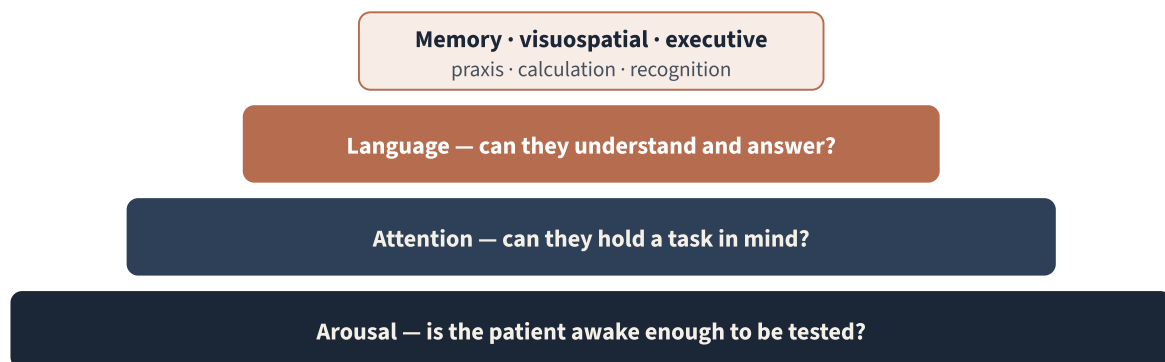


Figure 1. Test from the bottom up. A drowsy patient fails attention; an inattentive patient fails memory; an aphasic patient fails any test given in words. Report higher-level results as "limited by" the lower failure, not as separate deficits.

1.2 The setting

- **Glasses, hearing aids and dentures in.** Half of "confusion" on a ward is a deaf patient without an aid.
- **Quiet room, patient sitting up, one examiner.** Explain that some questions are easy and some are meant to be hard.
- **Ask about education, literacy, first language and handedness** before you begin. They change what normal is.
- **Get a collateral history.** The informant tells you about onset and course – sudden, stepwise, fluctuating or gradual – which no bedside test can.

1.3 Education, language and culture

Every cut-off in this guide comes from people who were tested in their own language and who mostly had years of schooling. A patient with little formal education can fail serial sevens, the pentagons, a written sentence and letter fluency while being cognitively normal. Use tasks that depend least on schooling – orientation, recall of a story or of words, category fluency, praxis, everyday function – and compare the patient with themselves over time, and with what the family says has changed.

Testing in Arabic

- **Digit span** works unchanged in Arabic numerals; say them at one per second, flat intonation.
- **Months backwards:** use the month names the patient uses – يناير، فبراير and so on in Sudan, Egypt and the Gulf; كانون الثاني، شباط in the Levant and Iraq – or the days of the week backwards for those who do not know the months in order.
- **Letter fluency** has no standard Arabic letter set with good norms, and the script mixes letters with diacritics; rely more on **category fluency** (animals, fruits), which travels well across languages.
- **Proverbs** must be ones the patient knows. «الصبر مفتاح الفرج» – patience is the key to relief – works for most Arabic speakers; a concrete answer is about a key and a door.
- **Screening tools** – the MoCA has official Arabic versions; the RUDAS was designed to be fair across cultures and literacy levels and is a good choice for patients with little schooling.
- **Use a professional interpreter** where possible, not a relative, who will helpfully supply the answers.

Part II

The domains

How to test · What is normal · What each failure means

2.1 Level of consciousness

How to test

Observe before you speak: eyes open or shut, posture, spontaneous movement, breathing pattern. Then escalate the stimulus – normal voice, loud voice, touch, then a painful stimulus (supraorbital or trapezius pressure, nail-bed pressure for limb responses). Record the **least stimulus that produces the best response**, and what that response was.

● **Say what you saw**

"Drowsy" and "confused" mean different things to different readers. Write "eyes open to loud voice, drifts off within ten seconds without stimulation; obeys one-step commands; GCS E3 V4 M6". Words such as lethargic, obtunded and stuporous describe a continuum of arousal and do not map onto GCS bands; give the components instead. In intubated or aphasic patients, the FOUR score (eye, motor, brainstem reflexes, respiration) avoids the verbal component.

Finding	Think of
Hypersomnolence, rousable	Paramedian thalamic or rostral midbrain lesion (artery of Percheron); hypothalamus; raised ICP; metabolic, drug or hepatic encephalopathy
Fluctuating alertness	Delirium; dementia with Lewy bodies; non-convulsive status epilepticus — ask for an EEG
Awake but motionless and mute, eyes following	Akinetic mutism — bilateral medial frontal or anterior cingulate, paramedian thalami, acute hydrocephalus. Distinguish from locked-in state (ask for vertical eye movements) and catatonia.
Coma with reactive, equal pupils	Metabolic or toxic cause more likely

Finding	Think of
Coma with a fixed or unequal pupil	Structural cause — herniation until proved otherwise

2.2 Orientation

Ask open questions; do not offer choices. "What is your full name? Where are we now — which building, which city? What is the date today — day, month, year? What day of the week? Why are you here?" Accept the date within a day or two and an approximate name for the hospital; record each answer, not just a total.

Orientation to time fails first, then place; loss of personal identity is rare in organic disease and should prompt consideration of a dissociative or functional cause. **Reduplicative paramnesia** — the conviction that this hospital is a copy of the real one, or is in the patient's home town — points to right frontal and parietal damage.

2.3 Attention and working memory

Test	Script and technique
Digit span forward	"I'll say some numbers. When I stop, say them back in the same order." One digit per second, no grouping, start at three, two trials per length.
Digit span backward	"Now say them backwards." "5 – 8 – 3" → "3 – 8 – 5". Start at two.
Months backwards	"Say the months of the year backwards, starting with December." The 4AT scores it as passed if the patient reaches July without error.
Serial sevens	"Take 7 from 100, and keep taking 7 from what's left." Depends on numeracy; give "spell WORLD backwards" or days of the week backwards as alternatives.

Normal: forward span 6 ± 1 in most adults (5 is the lower limit); backward span usually one or two shorter than forward, with fewer than 3 abnormal. Months backwards without error to July.

Pattern	Think of
Forward and backward both reduced; months backwards fail	Delirium and any global attentional failure — the most sensitive bedside sign of it
Forward normal, backward disproportionately poor	Working-memory failure: frontal-subcortical disease, vascular cognitive impairment, Parkinson's disease
Perseveration — repeating earlier digits or months	Frontal dysexecutive syndrome; basal ganglia disease

● Attention is the gatekeeper

A patient who cannot hold the task in mind cannot validly do anything above it in the hierarchy. If attention fails, mark later results as attention-limited rather than reporting them as separate deficits — and think delirium before dementia.

2.4 Language

Language is the most localising cognitive domain. Test six things, in this order: spontaneous speech, comprehension, repetition, naming, reading and writing.

Component	How	What to note
Spontaneous speech	"Tell me what brought you to hospital." Listen for a minute without interrupting; ask the patient to describe a picture if needed.	Fluency (phrase length, effort), grammar, word-finding pauses, paraphasias (wrong sounds or wrong words), prosody, articulation
Comprehension	Single words → one-step → multi-step commands, without gesturing: "Close your eyes." "Point to the ceiling, then to the door." "Touch your left ear with your right hand, then give me a thumbs-up." Yes/no questions: "Is a stone heavier than a feather?"	Separate comprehension from apraxia and from hearing; axial commands ("stand up", "close your eyes") are often preserved when limb commands fail
Repetition	"Say after me: the sky is blue." Then harder, with function words: "No ifs, ands or buts." "The cat hid under the house when the dog came."	The pivot of the aphasia matrix
Naming	Common, then less common objects and parts: pen, watch, then the strap, buckle, cap, nib.	Anomia is the most sensitive and least localising language sign. Note the response to cues.
Reading	Reading aloud and for comprehension: a written "Close your eyes".	Alexia with agraphia: left angular gyrus. Alexia <i>without</i> agraphia: left occipital and splenium.
Writing	"Write a sentence about the weather."	Aphasic patients write as they speak; writing is the most fragile language function and the first to fail in delirium.

Aphasia	Fluency	Comprehension	Repetition	Naming	Lesion
Broca	Non-fluent	Relatively intact	Impaired	Impaired	Left inferior frontal gyrus and beneath
Wernicke	Fluent, paraphasic	Impaired	Impaired	Impaired	Left posterior superior temporal gyrus
Conduction	Fluent, phonemic errors	Intact	Severely impaired	Impaired	Left supramarginal gyrus, arcuate fasciculus
Global	Non-fluent	Impaired	Impaired	Impaired	Large left perisylvian (MCA) lesion
Transcortical motor	Non-fluent	Intact	Preserved	Impaired	Left SMA, anterior border zone
Transcortical sensory	Fluent	Impaired	Preserved	Impaired	Left posterior border zone; also semantic dementia and Alzheimer's disease
Mixed transcortical	Non-fluent	Impaired	Preserved, echolalic	Impaired	Both border zones — isolation of the speech area
Anomic	Fluent	Intact	Intact	Impaired	Anywhere; least localising

Table 2.4 Repetition impaired: the lesion is in the perisylvian zone. Repetition preserved: outside it (transcortical), or subcortical.

● What a cue tells you

When naming fails, give a **phonemic cue** ("it starts with p..."). If the word comes, the knowledge is intact and the problem is retrieval – typical of most vascular aphasias and early Alzheimer's disease. If the patient cannot name it even with the word supplied, and then asks "what is a pen?", the concept itself is degraded – semantic dementia, or a left anterior temporal lesion.

Right-hemisphere language. Flat, monotonous speech and difficulty reading emotional tone in others (aprosodia) follow right frontal or temporoparietal lesions – easily mistaken for depression.

2.5 Memory

Step	Script and technique
Registration	"I'm going to say three words. Repeat them now and try to remember them: <i>apple, honesty, tunnel</i> ." Repeat until all three are registered (up to three trials) and note how many trials it took. If registration fails, recall cannot be interpreted.
Delayed recall	After five minutes of other testing: "What were the three words?"
Cued recall and recognition	For missed words: category cue ("one was a fruit"), then a choice ("apple, orange or banana?").
Anterograde, everyday	Recent events on the ward, what they ate, who visited, how they came to hospital – checked against the record.
Retrograde	Personal and public events over decades – checked with the family.

Normal: registration of all three words on the first trial; spontaneous recall of all three (two of three is borderline in older adults); a five-item name-and-address test is more sensitive than three words.

Pattern	Think of
Poor recall, not helped by cues or choices	Failure to store – hippocampal and medial temporal disease: Alzheimer's disease, Korsakoff syndrome, herpes simplex encephalitis, hypoxia, bilateral PCA or thalamic infarction
Poor recall, normal with cues or choices	Failure to retrieve – frontal-subcortical: vascular cognitive impairment, Parkinson's disease, Huntington's disease, normal-pressure hydrocephalus, depression
Dense anterograde amnesia for hours, repetitive questioning, otherwise normal, resolving within 24 hours	Transient global amnesia – after excluding seizure and stroke
Confabulation	Korsakoff syndrome (mammillary bodies, medial thalamus); basal forebrain and orbitofrontal damage, as after anterior communicating artery aneurysm rupture
Retrograde loss far greater than anterograde, or loss of personal identity	Consider a functional (dissociative) amnesia

● Always test recognition when recall fails

A patient who recalls none of three words but picks all three from choices has not lost the memories – they cannot fetch them. That single distinction moves the differential from hippocampal to frontal-subcortical, and from Alzheimer's disease towards vascular disease, parkinsonism or depression.

2.6 Visuospatial and constructional function

Clock drawing – "Draw a clock face, put in all the numbers, and set the hands to ten past eleven." **Copying** – intersecting pentagons and a wire cube. Score qualitatively and describe the errors; numerical scoring systems differ.

Error	Think of
Numbers crowded on the right; left side of the clock empty	Left neglect – right parietal lesion

Error	Think of
Poor overall organisation, lost spatial relations in copying	Constructional apraxia — right (or left) parietal; Alzheimer's disease and dementia with Lewy bodies (copying is disproportionately poor in Lewy body disease)
Hands set to "10" and "11", or a single hand on the 10 — pulled by the stimulus	Executive failure: frontal or frontal-subcortical
Can see only one element of a scene at a time	Simultanagnosia — bilateral parieto-occipital (Balint syndrome, posterior cortical atrophy)

2.7 Executive function

Test	Script and normal
Letter fluency	"Say as many words as you can that begin with F, in one minute — no names of people or places, and not the same word with a different ending." The MoCA counts 11 or more as normal.
Category fluency	"Name as many animals as you can in one minute." Fewer than about 15 is abnormal in an educated adult; adjust downwards for little schooling.
Abstraction	Similarities ("How are an orange and a banana alike?" — fruit) and proverbs the patient knows. A concrete answer is abnormal if education allows abstraction.
Motor sequencing	Luria fist-edge-palm: demonstrate three times, then "you carry on." Inability to learn the sequence or perseveration is abnormal.
Inhibition	Go/no-go: "Tap once when I tap once; don't tap when I tap twice." Following the examiner's taps is abnormal.
Frontal release signs	Grasp, palmomental, pout and glabellar tap (Myerson). Only the grasp reflex is reliably abnormal in adults; the others are common in healthy older people.

Pattern	Think of
Letter fluency much worse than category fluency	Frontal or frontal-subcortical dysfunction — behavioural-variant frontotemporal dementia, vascular disease, Parkinson's disease
Category fluency much worse than letter fluency	Temporal and semantic failure — Alzheimer's disease, semantic dementia
Imitation and utilisation behaviour — the patient uses whatever is put in front of them	Medial frontal damage
Concrete thinking, perseveration, disinhibition, apathy	Frontal lobe syndrome; check education and psychiatric history before concluding

● Compare the two fluencies

Ninety seconds of letter and category fluency is one of the most useful bedside separators of frontal-subcortical from temporal disease, and of frontotemporal dementia from Alzheimer's disease. A brief battery such as the Frontal Assessment Battery (FAB) structures the rest.

2.8 Praxis

Apraxia is the inability to carry out a learned, skilled movement despite intact strength, sensation, coordination and comprehension. Test both hands.

- **Transitive (pantomime of tool use):** "Show me how you would brush your teeth... cut with scissors... hammer a nail." Using a finger as the toothbrush (body part as object) after being told not to is abnormal in adults.
- **Intransitive (gestures):** "Wave goodbye... salute... beckon someone over."
- **Sequential:** "Fold this paper, put it in the envelope and seal it."
- **Buccofacial:** "Show me how you blow out a match... sip through a straw."

Type	Lesion
Ideomotor	Correct idea, wrong movement. Left parietal (supramarginal) or left premotor; left hand only with an anterior callosal lesion
Ideational / conceptual	The plan or the use of objects breaks down. Left parietal or diffuse disease (Alzheimer's)
Limb-kinetic	Clumsy fine movements of one hand beyond the weakness — contralateral premotor cortex; corticobasal syndrome
Buccofacial	Left inferior frontal and insula — often with Broca's aphasia
Dressing	Right parietal — strictly a visuospatial disorder; look for neglect

2.9 Neglect

Test	How
Line bisection	A horizontal line about 20 cm long, centred in front of the patient: "Mark the middle." Consistent deviation towards the right suggests left neglect.
Cancellation	"Cross out every star (or every letter A) on this page." Omissions confined to one side are neglect.
Copying and drawing	A flower or a house: the left-sided petals or windows are left out.
Extinction	Touch the left hand, the right hand, then both at once, eyes closed: "Where did I touch?" Reporting single stimuli on each side but only the right when both are touched is extinction — a milder form of neglect. Test vision the same way.
Observation	Head and eyes turned to the right, the patient ignores people on the left, eats only the right side of the plate.

Finding	Think of
Left neglect	Right inferior parietal lobule or temporoparietal junction (also right frontal and subcortical lesions). Commoner, more severe and longer-lasting than right neglect.
Right neglect	Left parietal — often masked by aphasia
Anosognosia for hemiplegia	Right parietal with frontal involvement (Babinski's anosognosia)
Extinction only	A smaller right parietal lesion, or recovering neglect

● Neglect is not hemianopia

A patient with a hemianopia knows the field is missing and turns the head to compensate; a patient with neglect does not, even with intact visual pathways. Test fields and neglect separately — and remember that both often coexist after a large right MCA infarct.

2.10 Calculation and recognition

- **Calculation:** simple sums, then carrying ("What is 23 plus 19?"), then a practical problem with money.
Gerstmann syndrome – acalculia, agraphia, finger agnosia and right-left disorientation – points to the left angular gyrus.
- **Visual object agnosia:** the patient sees but cannot recognise an object by sight, yet names it by touch – bilateral occipitotemporal.
- **Prosopagnosia:** faces not recognised, voices are – fusiform gyri, usually bilateral or right.
- **Astereognosis:** cannot identify an object in the hand by touch with normal primary sensation – contralateral parietal.

Part III

Screening tools and delirium

What each instrument is for · The two delirium tests to know

3.1 Cognitive screening instruments

Tool	Time · score	Strengths and limits
MoCA	10 min · /30	Sensitive to mild cognitive impairment; tests executive function and naming. 26 or more is normal; add a point for 12 years of education or fewer. Official Arabic versions exist; training and certification are now required for use.
MMSE	8 min · /30	Widely known; weak on executive function and mild impairment; strongly affected by education. Under copyright.
Mini-Cog	3 min	Three-word recall plus clock drawing. Quick and relatively education-fair; a screen, not a diagnosis.
RUDAS	10 min · /30	Designed to minimise effects of culture, language and literacy — useful where formal schooling is limited.
ACE-III	15–20 min · /100	Broader profile by domain (attention, memory, fluency, language, visuospatial); helps separate dementia subtypes.
FAB	10 min · /18	Frontal Assessment Battery: similarities, fluency, sequencing, conflicting instructions, go/no-go, grasp.

Table 3.1 A score is a summary of a performance, not a diagnosis; report the items failed, not just the total.

3.2 Delirium

Delirium is an acute, fluctuating disturbance of attention and awareness caused by a medical condition, drug or withdrawal. It is common, frequently missed – particularly the quiet, hypoactive form – and carries a high mortality. Inattention is its core.

Tool	Items	Positive
4AT	(1) Alertness · (2) AMT4: age, date of birth, place, year · (3) Attention: months backwards · (4) Acute change or fluctuating course	4 or more: possible delirium. 1–3: possible cognitive impairment. Takes two minutes; no training needed.

Tool	Items	Positive
CAM / CAM-ICU	(1) Acute onset or fluctuating course · (2) Inattention · (3) Disorganised thinking · (4) Altered level of consciousness	1 and 2, plus either 3 or 4. CAM-ICU adapts this for ventilated patients.

◆ Delirium is a medical emergency until explained

- Look for the cause: infection, drugs (anticholinergics, opioids, benzodiazepines, steroids), withdrawal (alcohol, benzodiazepines), metabolic (sodium, glucose, calcium, urea), hypoxia or hypercapnia, urinary retention, constipation, pain, and new neurological disease – including non-convulsive seizures and posterior-circulation or right-hemisphere stroke.
- Thiamine before glucose in anyone at risk of Wernicke encephalopathy.
- Do not diagnose dementia during delirium. Reassess cognition once the delirium has cleared.

Part IV

Thinking in syndromes

From a list of failures to a localisation

One abnormal item is rarely diagnostic. Read the pattern.

Pattern	Likely localisation or syndrome
Non-fluent aphasia, right hemiparesis (face and arm), buccofacial and limb apraxia	Left frontal — superior division of the left MCA
Fluent aphasia, poor comprehension and repetition, no weakness	Left posterior temporal — inferior division of the left MCA
Left neglect, anosognosia, constructional and dressing apraxia, flat prosody	Right parietal — right MCA
Inattention, fluctuating alertness, disorganised thinking, acute onset	Delirium — find the cause
Early, isolated poor recall not helped by cues; category fluency worse than letter; later visuospatial failure	Medial temporal then posterior cortical — Alzheimer's disease pattern
Slowness, poor letter fluency, retrieval-type memory deficit helped by cues, apathy	Frontal-subcortical — vascular cognitive impairment, Parkinson's disease, normal-pressure hydrocephalus
Disinhibition, apathy, loss of empathy, compulsions, perseveration, relatively spared memory and visuospatial function	Behavioural-variant frontotemporal dementia
Fluent speech empty of content, loss of word meaning, impaired single-word comprehension, surface dyslexia	Semantic dementia — left anterior temporal lobe
Fluctuating attention, visual hallucinations, parkinsonism, disproportionately poor copying	Dementia with Lewy bodies
Hypersomnolence, amnesia, vertical gaze palsy	Bilateral paramedian thalami
Alexia without agraphia, right hemianopia	Left occipital and splenium — left PCA

Part V

Documenting it

A record another clinician can repeat

The aim of documentation is that someone else, tomorrow, can repeat the same tests and say whether the patient is better or worse. Record what was done and what the patient did, not adjectives.

A template

Background: right-handed; 8 years of schooling; first language Arabic, tested in Arabic; glasses worn; collateral from daughter – two-day decline, worse at night.

Arousal: eyes open spontaneously; GCS E4 V4 M6; drifts off when not stimulated.

Attention: digit span 4 forward, 2 backward; months backwards – stopped at October with two errors.

Orientation: name correct; place "my house"; year 2019.

Language: fluent, occasional word-finding pauses; follows one-step, not two-step commands; repetition normal; named 3 of 5 objects, helped by phonemic cues.

Memory: registered 3/3 on second trial; recall 0/3, recognised 2/3 – attention-limited.

Visuospatial / executive: clock disorganised; animals 6 in one minute – attention-limited.

Summary: 4AT 8 – delirium likely; higher-level results not interpretable until attention recovers.

Part VI

Cases

Six patients

Case 1

An 81-year-old woman, two days after hip surgery, is "not herself". She is drowsy, cannot say the months backwards past November, and her answers drift. Her daughter says she was independent and sharp a week ago.

- A. Alzheimer's disease
- B. Delirium
- C. Depression
- D. Right MCA stroke

B. Acute change, fluctuating alertness and inattention: delirium. Look for infection, drugs (opioids, anticholinergics), retention, pain and metabolic causes; do not test memory or label dementia now.

Case 2

A 64-year-old man has been slower for a year. He recalls 0 of 3 words but chooses all three correctly from a list. Letter fluency 5 words; animals 14. He has a shuffling gait and urinary urgency.

- A. Alzheimer's disease
- B. Frontal-subcortical pattern — consider normal-pressure hydrocephalus or vascular disease
- C. Semantic dementia
- D. Transient global amnesia

B. Retrieval-type memory deficit (rescued by recognition), letter fluency worse than category, gait and urinary signs: a frontal-subcortical pattern. Image for ventricular enlargement and white-matter disease.

Case 3

A 70-year-old woman speaks fluently but uses vague words ("the thing"), cannot say what a "camel" is when asked, and reads "yacht" as "yatched". Memory for recent events and her drawing are good.

- A. Wernicke's aphasia
- B. Semantic dementia
- C. Conduction aphasia
- D. Alzheimer's disease

B. Loss of word meaning with fluent speech, surface dyslexia (irregular words read by rule) and preserved day-to-day memory and visuospatial function: the semantic variant of primary progressive aphasia — left anterior temporal atrophy.

Case 4

A 59-year-old right-handed man cannot repeat "no ifs, ands or buts" but speaks fluently with sound errors ("pell" for "pen"), understands complex commands, and has no weakness.

- A. Broca's aphasia
- B. Transcortical sensory aphasia
- C. Conduction aphasia
- D. Anomic aphasia

C. Fluent, comprehension intact, repetition disproportionately impaired, phonemic paraphasias: conduction aphasia — left supramarginal gyrus and arcuate fasciculus.

Case 5

A 67-year-old woman after a right-sided stroke eats only the right half of her plate, draws a clock with all the numbers on the right, and insists her left arm moves normally.

- A. Left homonymous hemianopia only
- B. Left neglect with anosognosia — right parietal
- C. Delirium
- D. Ideomotor apraxia

B. Neglect with anosognosia for hemiplegia: right parietal involvement, usually right MCA. Test fields separately – hemianopia and neglect often coexist but are different deficits.

Case 6

A 61-year-old man is brought in asking the same questions every few minutes: "What day is it? Why am I here?" He knows who he is, his speech and examination are otherwise normal, and he was digging in the garden an hour before onset.

- A. Transient global amnesia
- B. Functional amnesia
- C. Left PCA stroke
- D. Focal seizure with impaired awareness

A. Isolated anterograde amnesia with repetitive questioning, intact identity and no other signs, often after exertion: transient global amnesia. It resolves within 24 hours; recurrence, brief repeated episodes or other signs should prompt a search for epilepsy or stroke.

Appendix

Sources

For checking and further reading

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