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Myanmar Neurological Society

Vascular Dementia

“A forgetful person, in no real distress who can no longer do their job, can no longer be independent and

who cannot really sustain any

ordinary sensible conversation.”

1. What is dementia?
2. Burden of dementia
3. Anatomy and function
4. Historical Background
5. Aetiology of Vascular dementia
6. Criteria for vascular dementia
7. Classification of dementia
8. Types and proposed mechanisms of vascular dementia
9. Clinical features of vascular dementia
10. Clinical tools for dementia
11. Management of vascular dementia

1. What is Dementia?

Dementia ….

- **memory impairment**
- impairment in **other ≥2 cognitive domains**
    - Orientation
    - Attention
    - Language
    - Visuo-spatial functions
    - Motor control
    - Praxis
    - Executive functions
- Progressive impairment in **functional status**

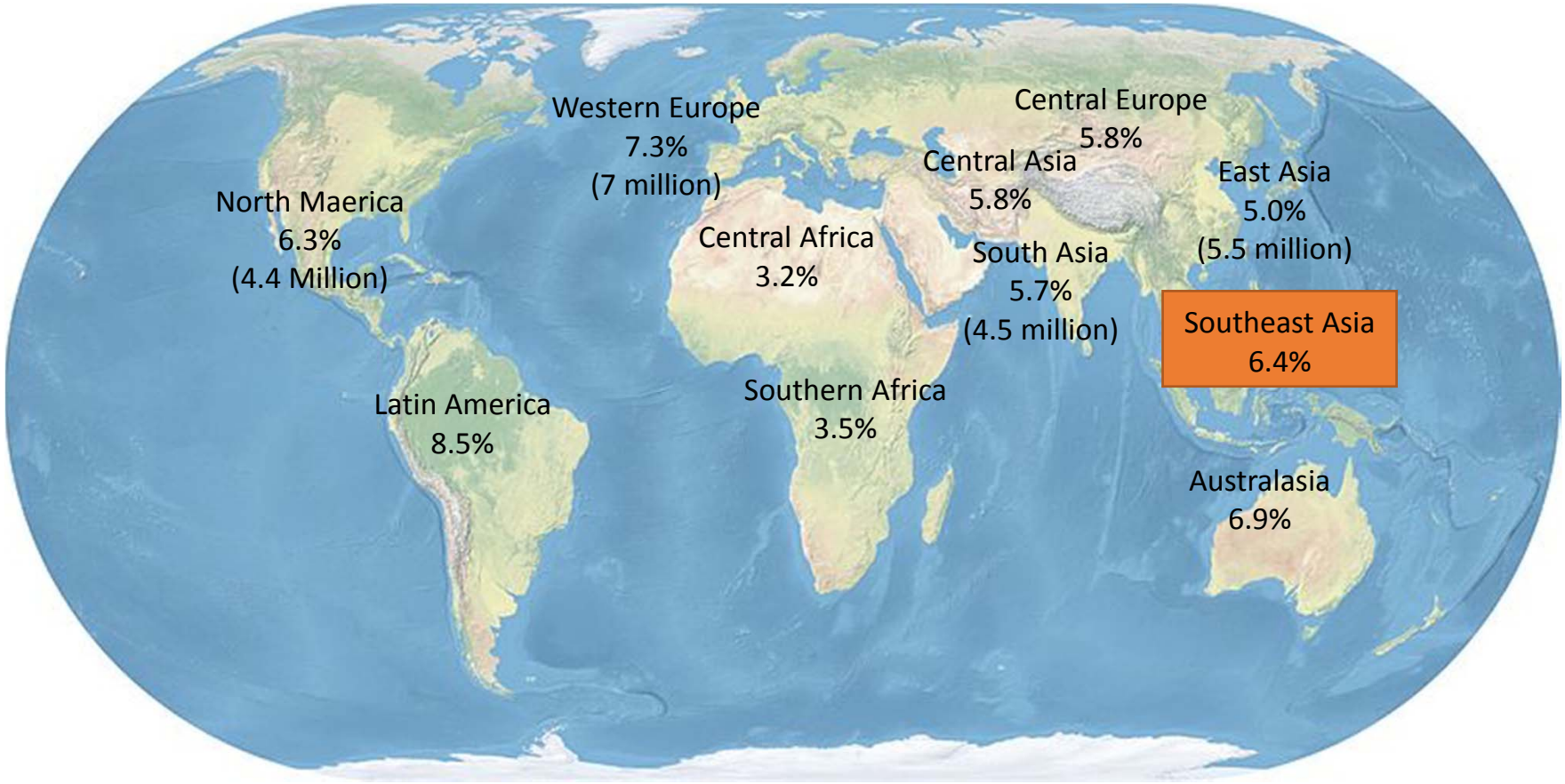
2. Burden of Dementia

- Globally nearly **9.9 million** people dementia each year; this figure translates into **1 new case every 3 seconds**.

- In 2015, dementia affected **47 million** people worldwide, a figure that is predicted to increase to **75 million in 2030** and **132 million by 2050**.

- In 2015, dementia costs were estimated at **US$ 818 billion**
- By 2030, it is estimated that the cost of caring for dementia people worldwide will have risen to **US$ 2 trillion**.

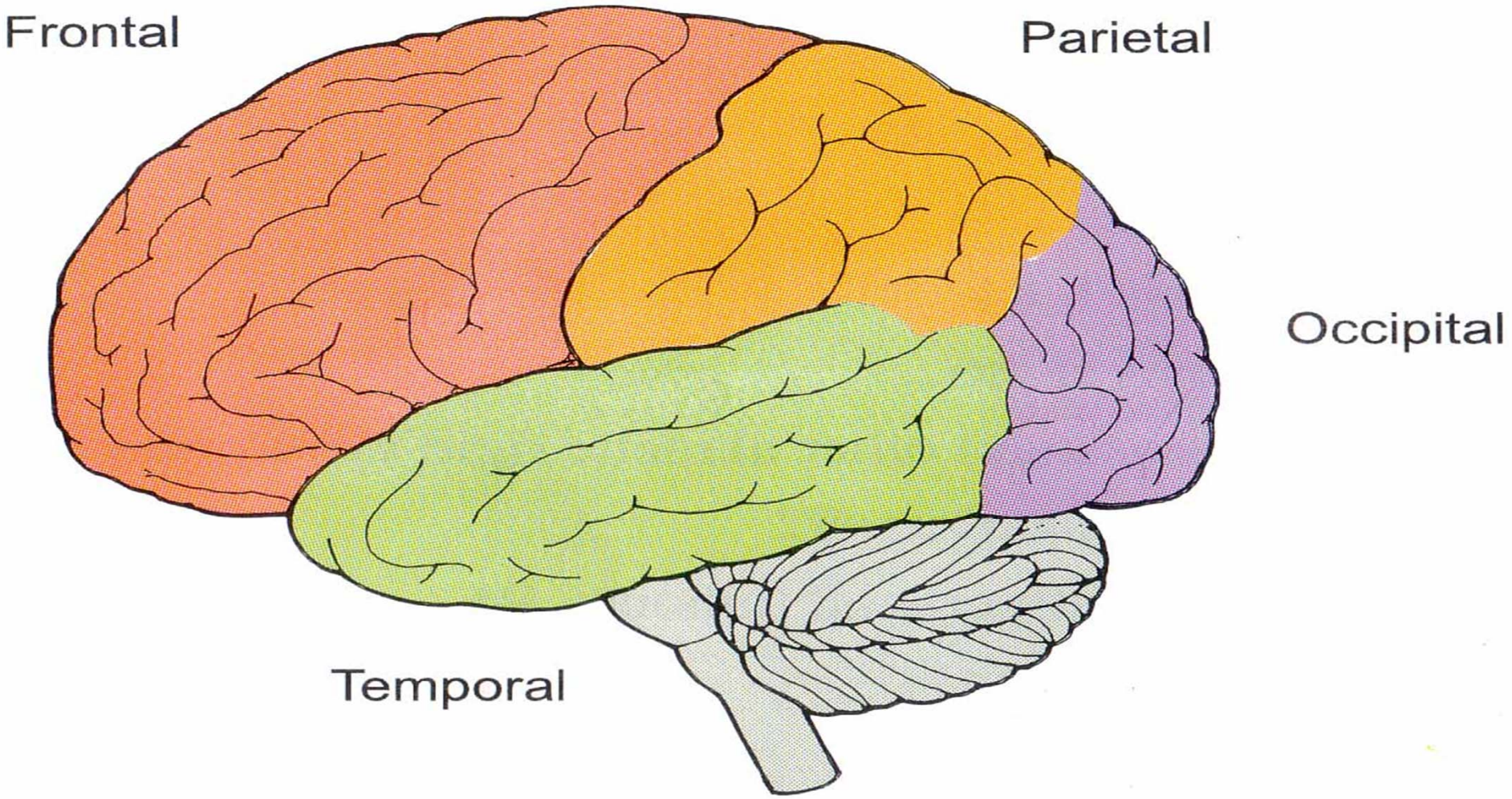
Global prevalence of dementia

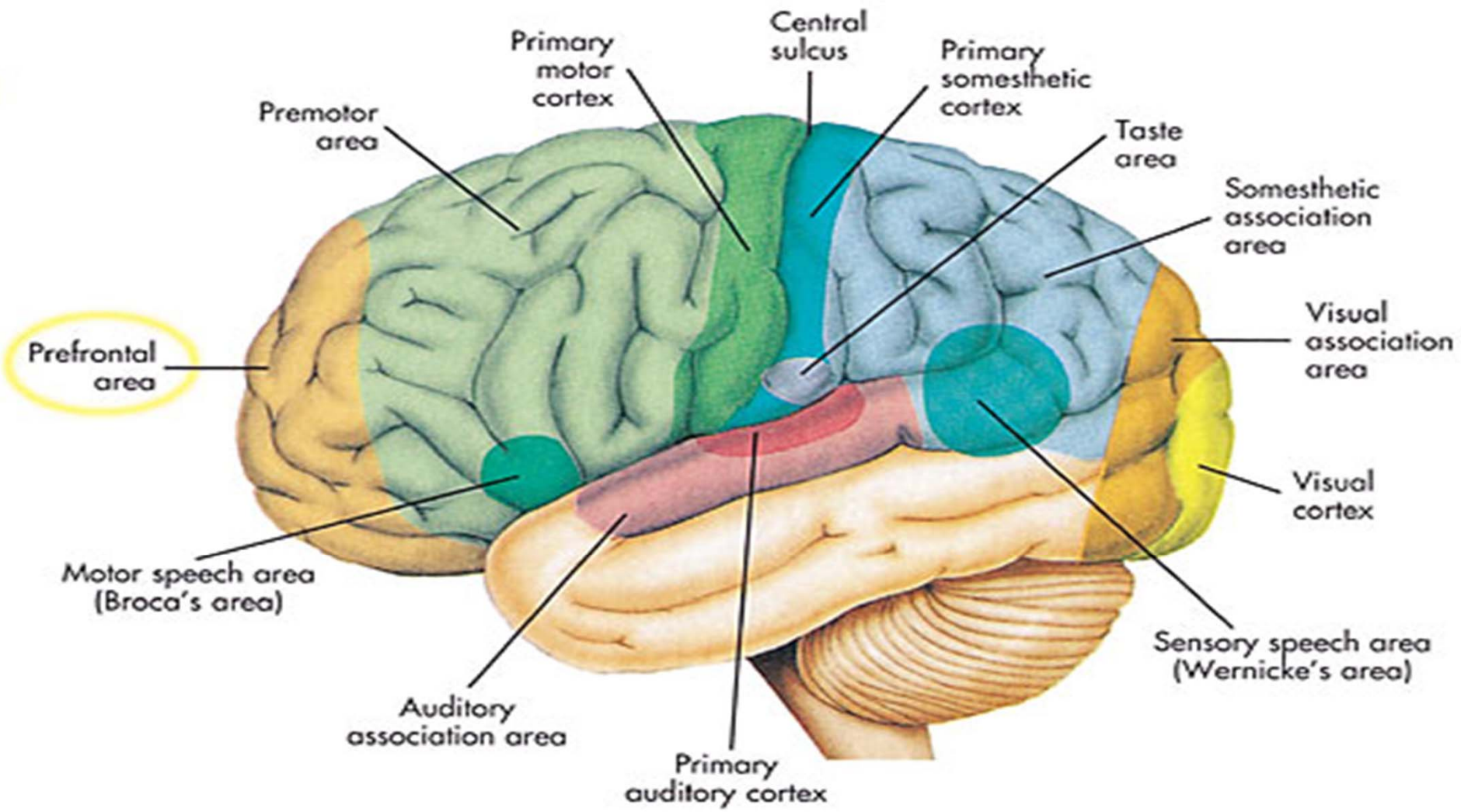


World health Organization (WHO) Dementia: a public health priority. Geneva WHO, 2012.

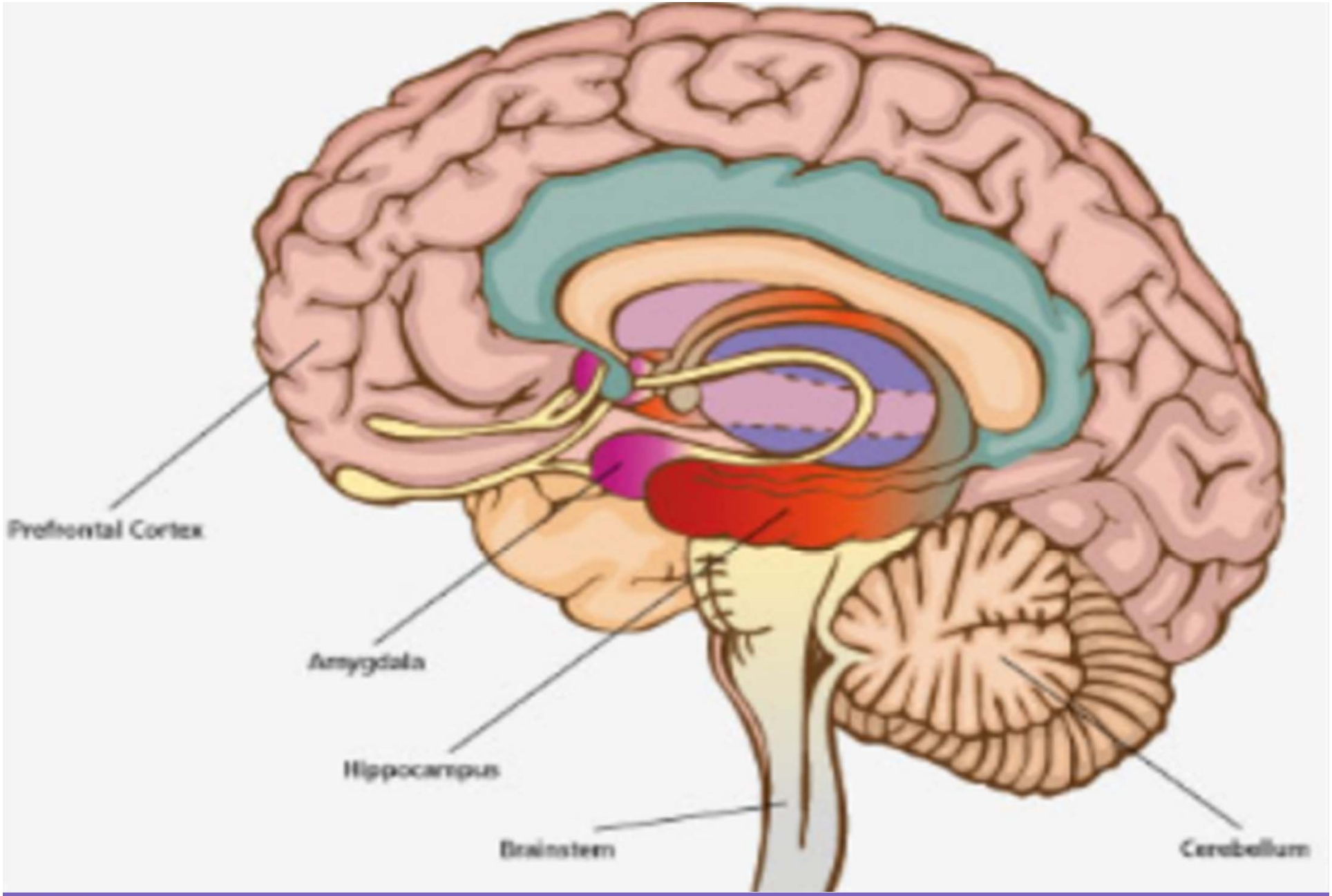
3. Anatomy & Physiology

Lobes of the brain





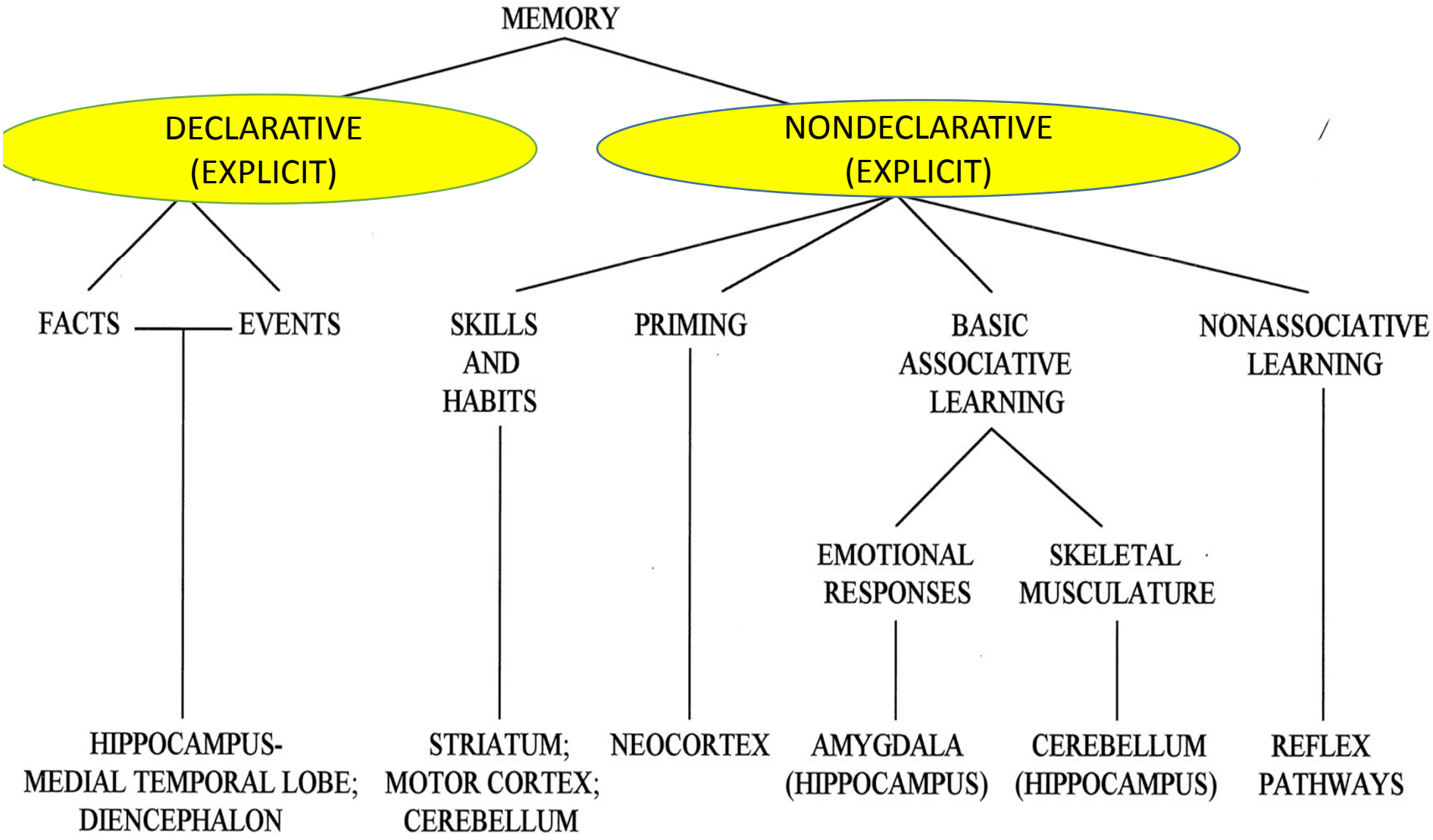
Anatomy and Cortical Lobe Functions


Prefrontal Cortex
Amygdala
Hippocampus
Brainstem
Cerebellum

Cortical lobar functions

Lobe	Function	Effects of damage Cognitive / Bahavioural
Frontal	Personality Emotional control Social behavior **Language** Micturition Contralateral motor control	Disinhibition Lack of initiation Anti-social behavior **Impaired memory** **Expressive dysphasia** Incontinence Contralateral Hemiplegia
Parietal: dominant	**Language** **Reading** **Writing** **Calculation**	**Dysphasia** **Dyslexia** **Dysgraphia** **Dyscalculia** **Apraxia, Agnosia**

Parietal: non-dominant	**Spatial orientation** **Constructional skills**	**Spatial disorientation** **Neglect of non-dominant side** **Constructional apraxia** **Dressing apraxia**
Temporal: dominant	**Auditory perception** **Language** **Verbal memory** Smell Balance	**Receptive aphasia** **Dyslexia** **Impaired memory** Complex hallucinations (smells, sound, vision, memory)
Temporal: non-dominant	Auditory perception Melody / pitch perception **Non-verbal memory** Smell Balance	Impaired musical skills (tone perception) **Impaired non-verbal memory** Complex hallucinations (smells, sound, vision, memory)
Occipital	**Visual processing**	Visual inattention Visual loss **Visual agnosia**


MEMORY
DECLARATIVE (EXPLICIT)
NONDECLARATIVE (EXPLICIT)
FACTS
EVENTS
SKILLS AND HABITS
PRIMING
BASIC ASSOCIATIVE LEARNING
NONASSOCIATIVE LEARNING
EMOTIONAL RESPONSES
SKELETAL MUSCULATURE
HIPPOCAMPUS-MEDIAL TEMPORAL LOBE; DIENCEPHALON
STRIATUM; MOTOR CORTEX; CEREBELLUM
NEOCORTEX
AMYGDALA (HIPPOCAMPUS)
CEREBELLUM (HIPPOCAMPUS)
REFLEX PATHWAYS

4. Historical Background

- In 1672, Thomas Willis first reported cases of vascular dementia post apoplexy (later known as post stroke dementia). He separated mental retardation from dementia.

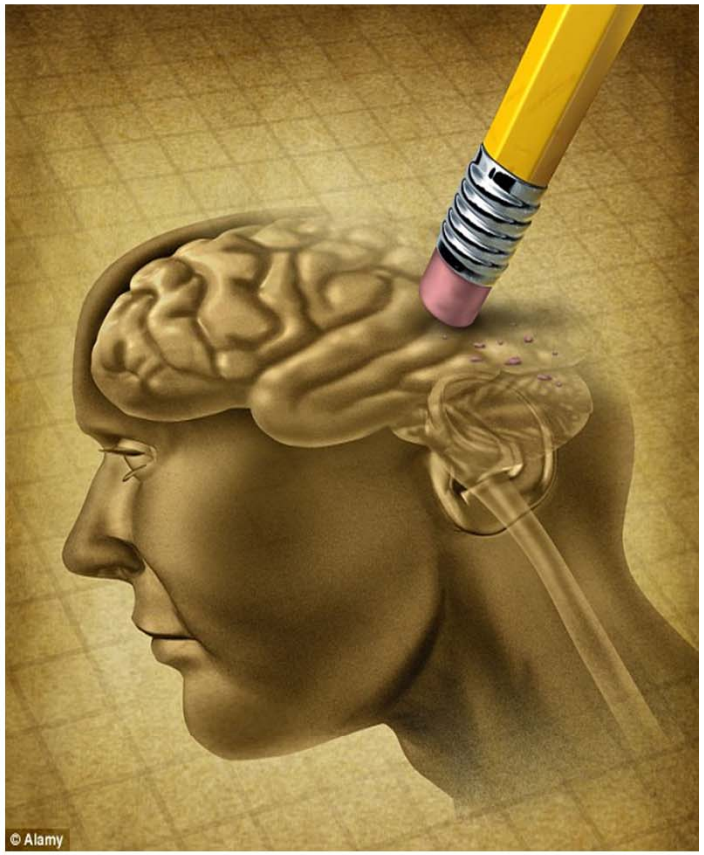
- In 1894, Otto Binswanger and Alois Alzheimer separated vascular dementia from dementia paralytica caused by neurosyphilis. They described dementia postapoplexy, arteriosclerotic brain degeneration, vascular cortical atrophy and Binswanger's disease.

- Hachinski in 1974 used the term "multi-infarct dementia".

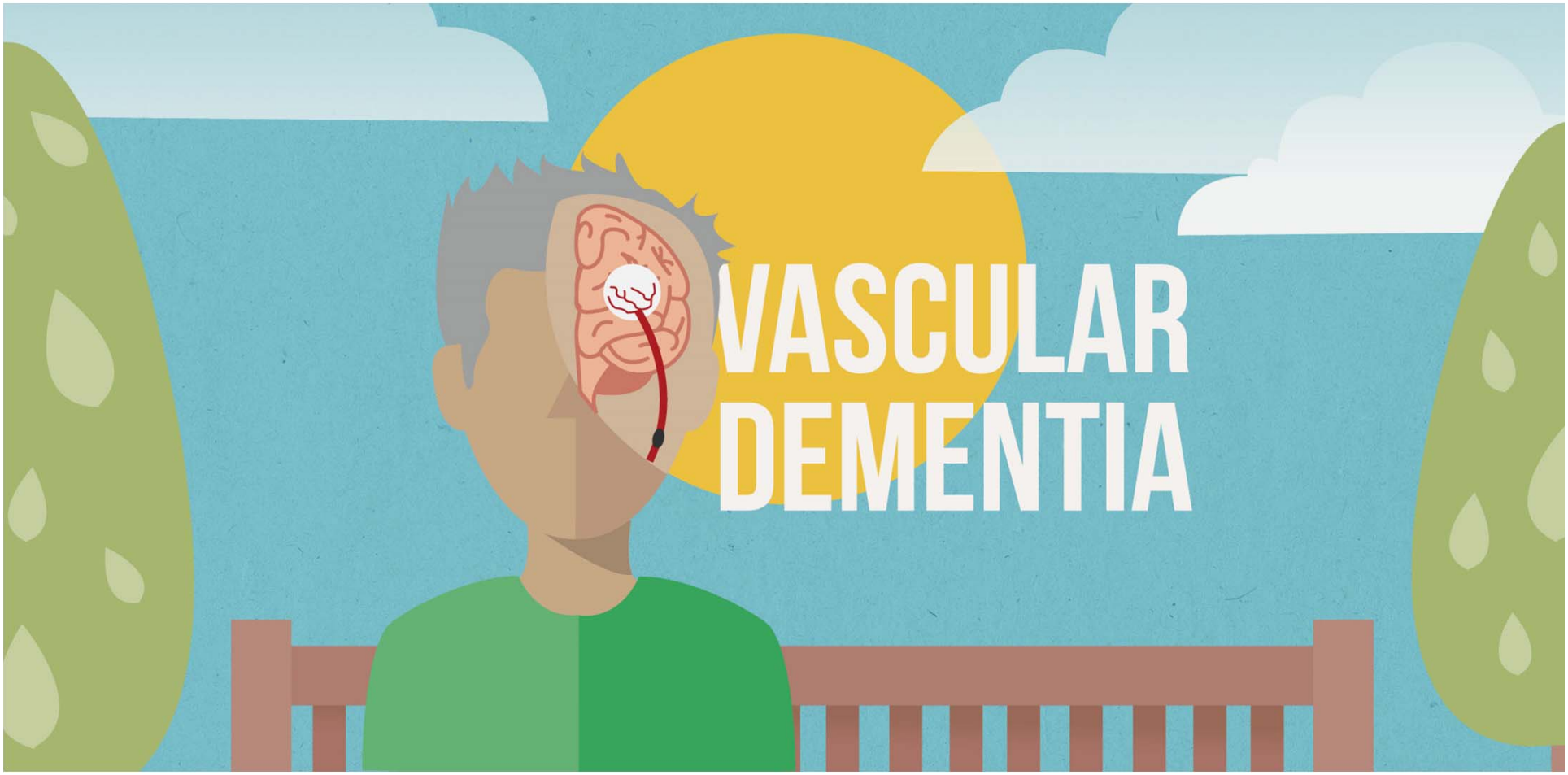
- In 1995, the name "vascular cognitive impairment "was proposed by Bowler & Hachinski to emphasize the need for prevention and early diagnosis.

5. Aetiology of VaD

- Stroke (but no clear link with location)
- Hypertension (in mid-life)
- Hypotension (in late-life)
- Hyperlipidaemia (in some studies)
- Diabetes (& ‘metabolic syndrome’)
- Smoking (and probably other risk factors)
- Genetic causes (rare)
- But age is strongest ‘risk factor’



6. Criteria for Vascular Dementia



NINDS-AIREN Criteria (Roman et al, 1993)

A) Dementia

B) Cerebrovascular disease (confirmation by brain imaging -must)

- ✓Infarcts-single strategic, multiple cotical, multiple lacunar
- ✓Small vessel (Leukoaraiosis/Binswanger)
- ✓ICH, Hypoperfusion
- ✓Genetic - CADASIL
- ✓Vasculitis

C) A and B must be reasonably related

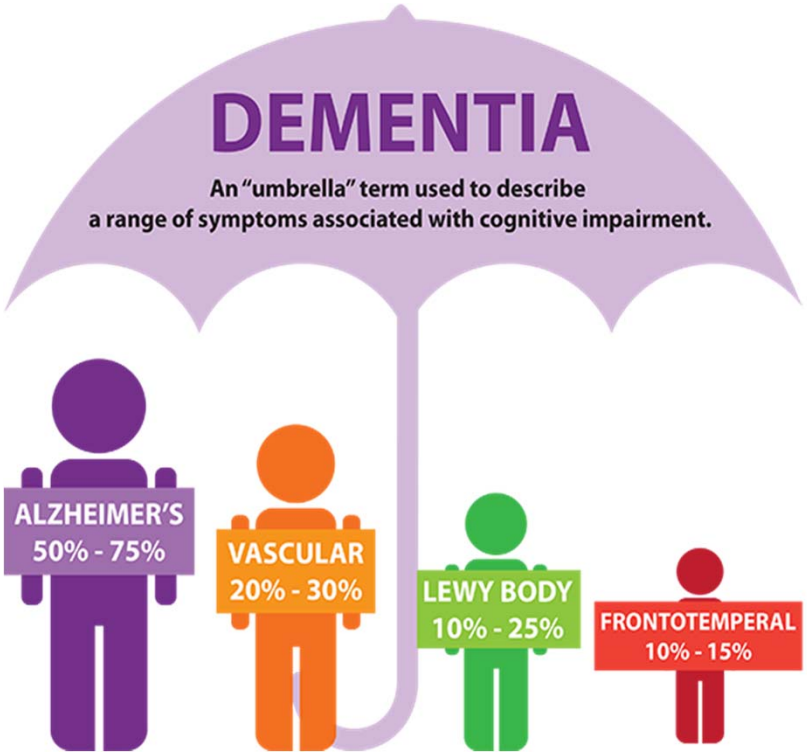
Based on Román GC et al: Vascular dementia: Diagnostic criteria for research studies. Report of the NINDS-AIREN International Workshop held at the National Institutes of Health, Bethesda, Md, April 19-21, 1991. *Neurology* 1993;43:250-260.

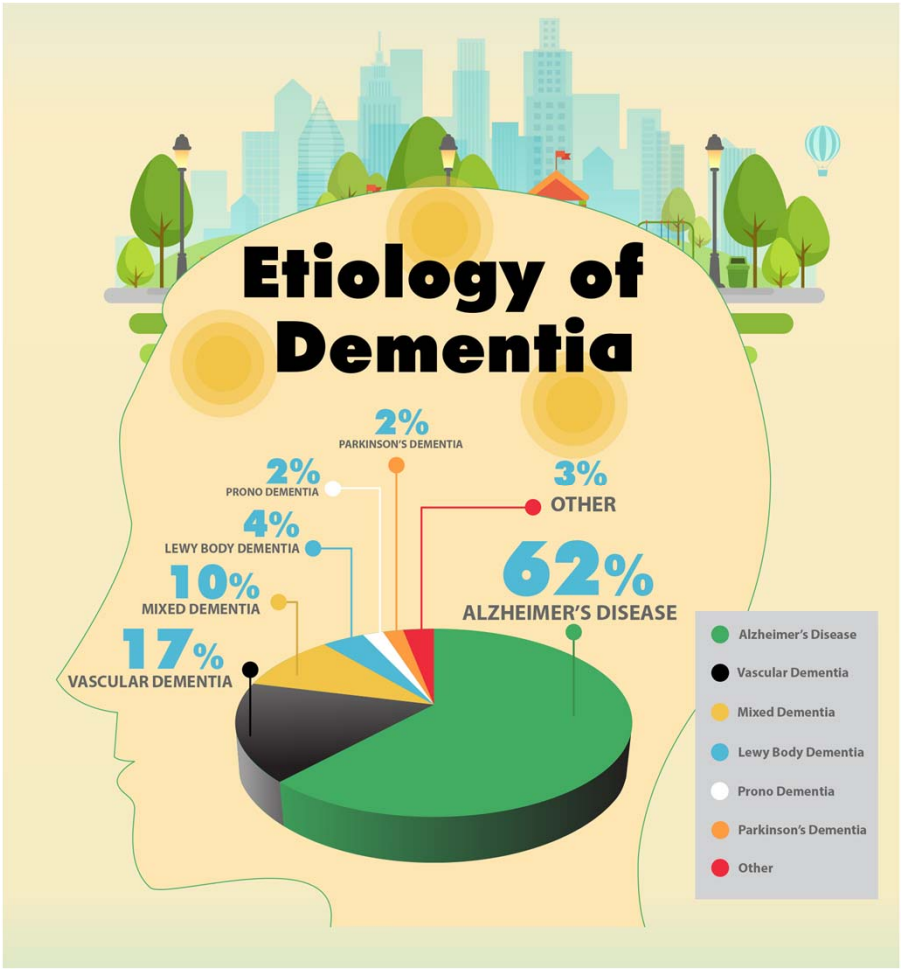
DSM-IV Criteria for VaD

1. Multiple Cognitive Deficits including amnesia
2. Significant impairment in social or occupational functioning which is a change
3. Presence of focal neurological signs and symptoms or laboratory evidence (=neuroimaging) of cerebrovascular disease judged to be aetiologically related to dementia (stepwise decline dropped)
4. Deficits not only during a delirium

Diagnosis and Statistical Manual of Mental Disorders, Fourth Edition, American Psychiatric Association,2000.

7. Classification of dementia





Classification of dementia (depends on Anatomy)

	Cortical dementia	Subcortical dementia
Neuropathology	Cortical association areas	Striatum, Thalamus
Severity	More severe	Mild to moderate
Speed of cognition	normal but frequent errors	slow
Neuropsychology	More severe memory impairment unaided by cues, Dysphasia, dyspraxia, agnosia	memory impairment, Recall aided by cues
Mood	Depression less common	Apathy, Depression
Motor abnormalities	common, Gegenhalten	Extrapyramidal, dysarthria

Classification of dementia (depends on Pathophysiology)

Alzheimer's dementia
(60%)

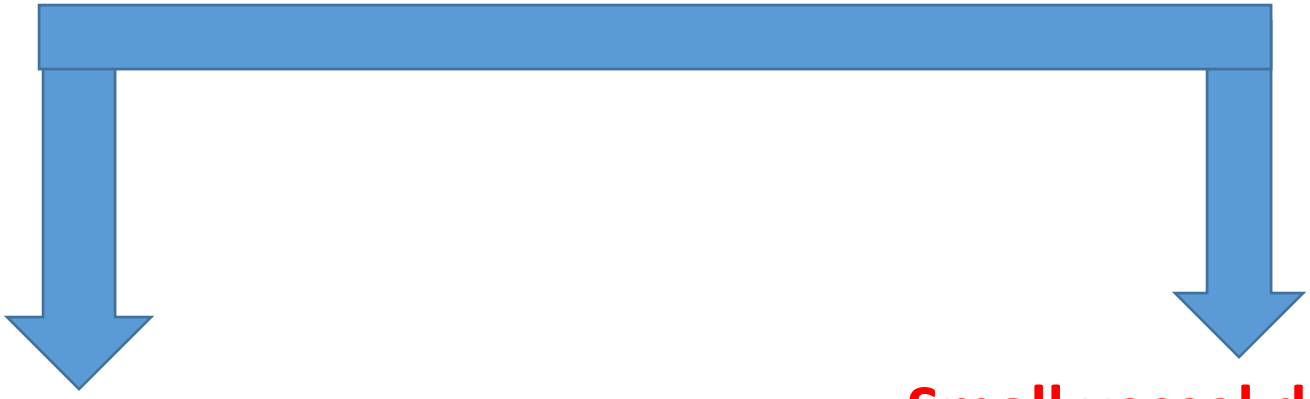
Vascular dementia
(20%)

Others
- Lewy Body dementia
-Frontal lobe dementia
-Parkinson disease dementia
-Corticobasal degeneration
-Normal pressure hydrocephalus

Mixed dementia (combination of AD and vascular dementia)

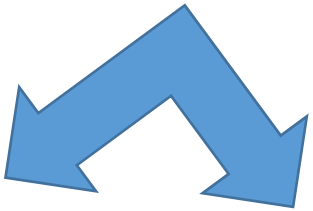
8. Types & Proposed mechanism of vascular dementia

Types of Ischaemic Vascular dementia



Large vessel disease

Small vessel disease (Subcortical vascular dementia)

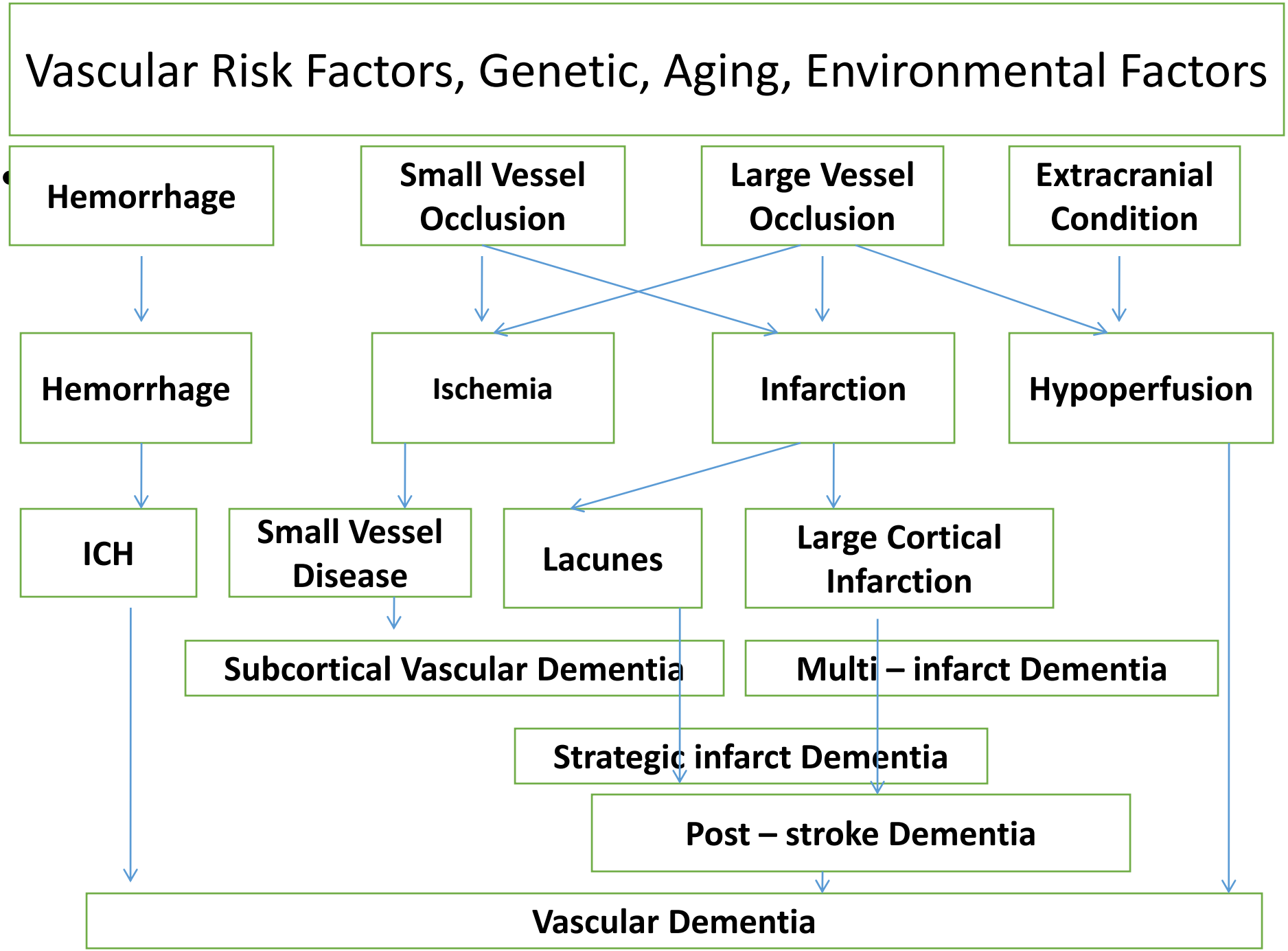


Single strategic infarct dementia

Multi-infarct dementia

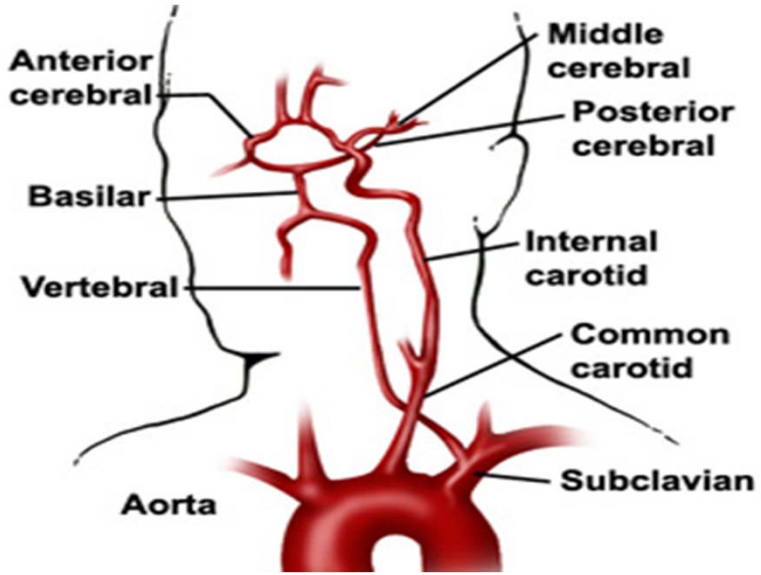
1. Multiple small deep infarcts (Lacunes)

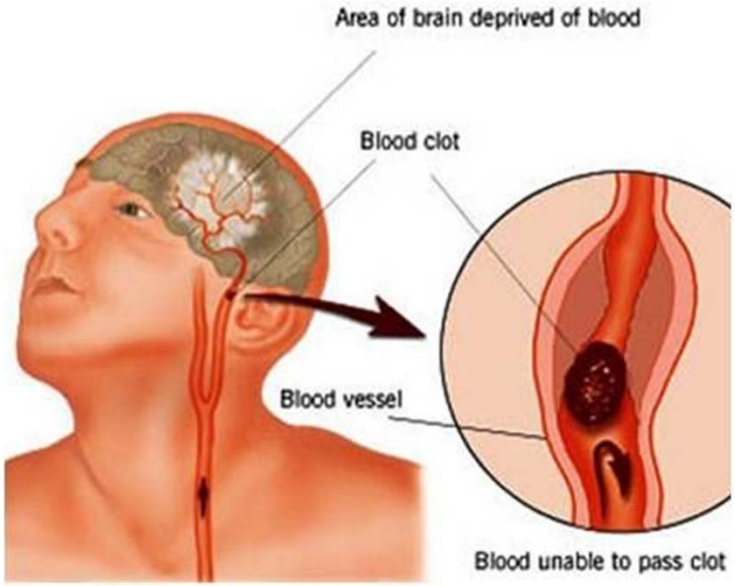
2. Diffuse ischaemic lesions of deep white matter (Binswanger / Leukoaraiosis)


Vascular Risk Factors, Genetic, Aging, Environmental Factors
Hemorrhage
Small Vessel Occlusion
Large Vessel Occlusion
Extracranial Condition
Hemorrhage
Ischemia
Infarction
Hypoperfusion
ICH
Small Vessel Disease
Lacunes
Large Cortical Infarction
Subcortical Vascular Dementia
Multi – infarct Dementia
Strategic infarct Dementia
Post – stroke Dementia
Vascular Dementia

Dementia due to large vessel disease

1. Single strategic infarct dementia
2. Multi-infarct dementia





1. Single strategic infarct

Anterior Cerebral Artery (ACA) (Inferomedial frontal infarct)

- Abulia, memory impairment, language impairment

Lt Middle Cerebral Artery (MCA) infarct (Dominant parieto-temporal, temporo-occipital association, angular gyrus)

- Aphasia with cognitive impairment

Rt MCA (Non- Dominant pareito-temporal , temporo-occipital association)

- visuo-spatial functions

Posterior cerebral artery (PCA) (Bilateral inferomedial temporal or thalamic infarct)

- Amnesia

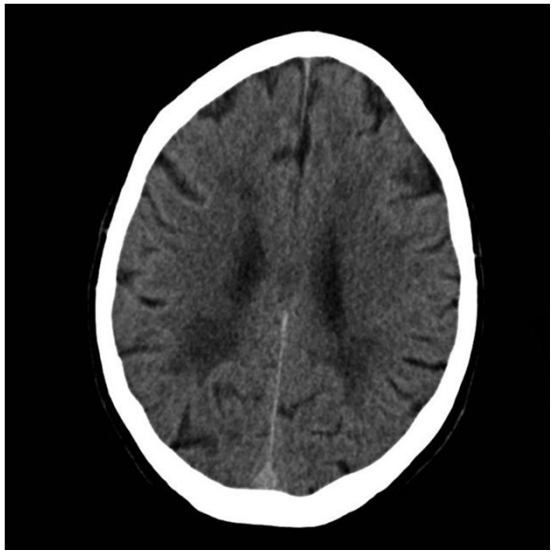
Watershed infarcts (Superior frontal or parietal)

Lacunar infarcts (Bilateral thalamic)

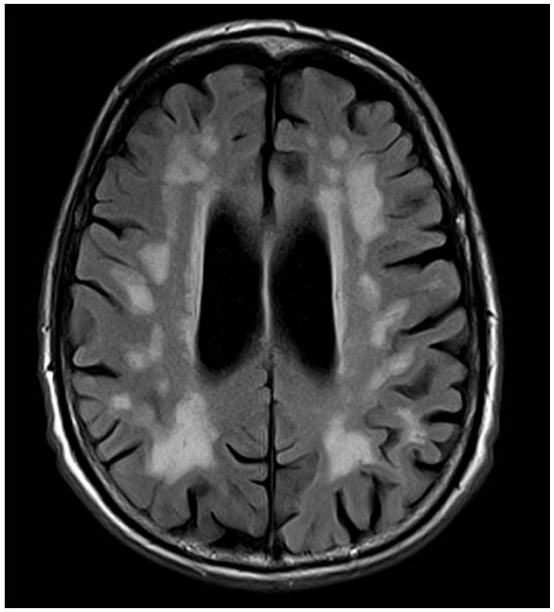
- Amnesia

2. Multi-infarct dementia (MID)

- Multiple large infarct
- Destroying critical brain volume
- Not necessarily at strategic sites

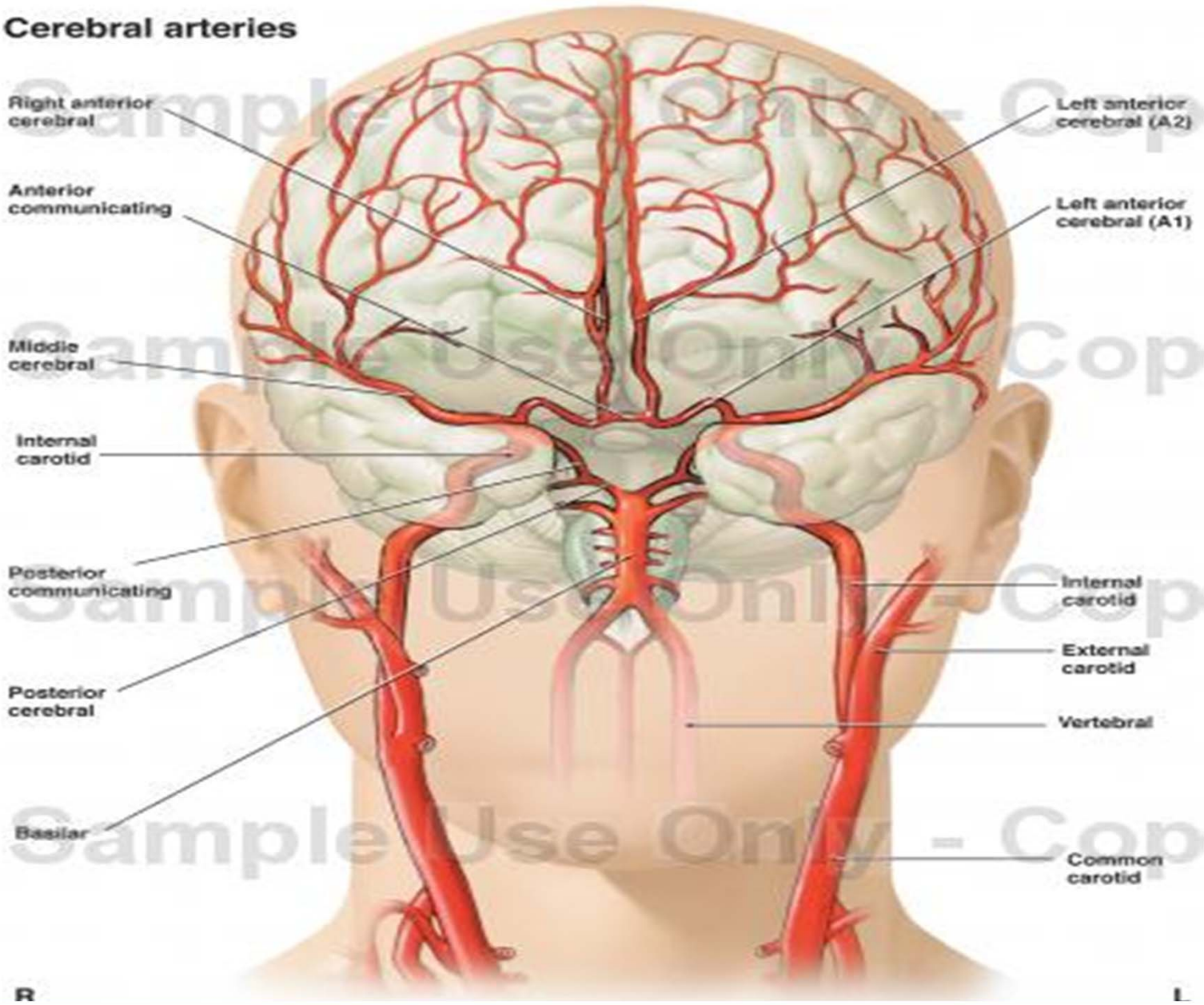


- Dementia occurs 'stroke by stroke', with progressive focal loss of function



- Diagnosis is obtained from the history and confirmed by CT or MRI scan (presence of multiple areas of infarction)

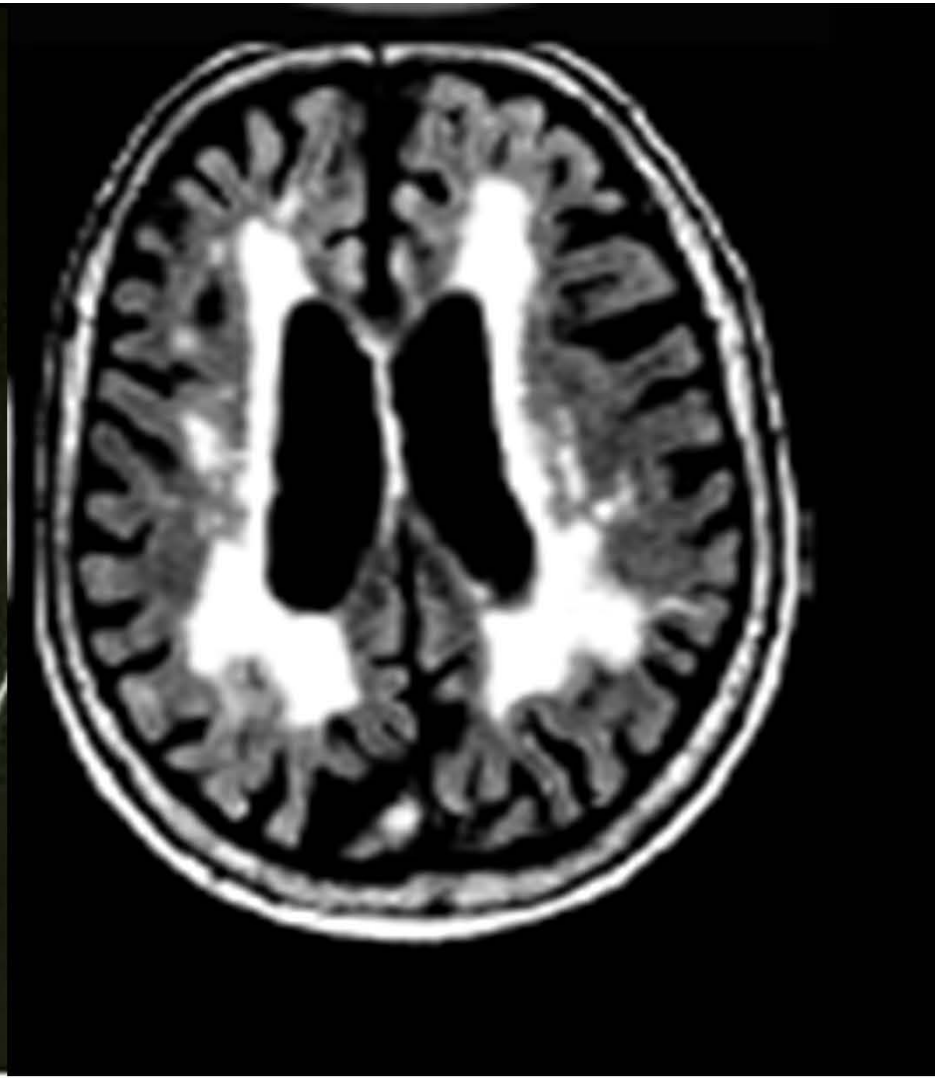
Dementia due to small vessel disease



3. Small vessel disease

1. Multiple small deep infarcts (Lacunes)
2. Widespread patchy or diffuse ischaemic lesions of deep cerebral white matter (Binswanger disease)
   - ✓ Symptoms develop more gradually
   - ✓ Abulia
   - ✓ Abnormal behaviour with up and down emotion
   - ✓ Pseudobulbar palsy
   - ✓ Pyramidal signs
   - ✓ Disturbed gait
   - ✓ Loss of bladder control and Urinary incontinence
   - ✓ CT/MRI – periventricular or subcortical lucencies (Leukoaraiosis)

SVD can progress silently for many years before becoming clinically evident

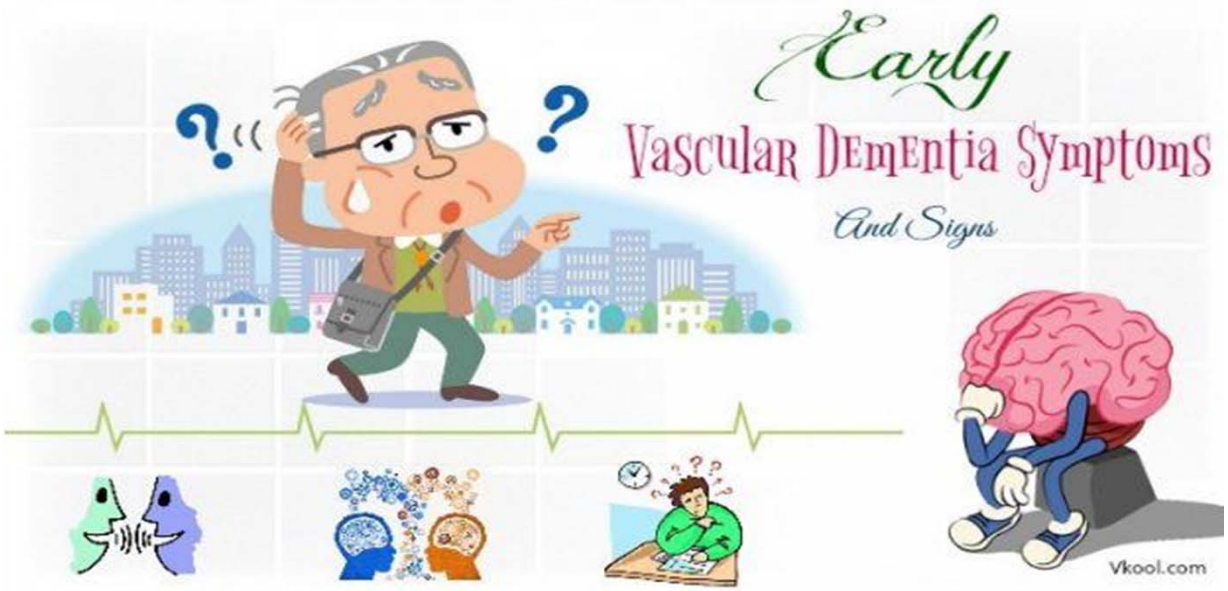


Lacunes (CT) **Leukoaraiosis (MRI)**

CADASIL

- **C**erebral **A**utosomal **D**ominant **A**rteriopathy with **S**ubcortical **I**nfarcts and **L**eucoencephalopathy.
- mutations in NOTCH3 gene (which had a role in arterial development and is expressed on vascular smooth-muscle cells)
- Clinical phenotype:
  - Migraine
  - Recurrent strokes & TIAs
  - Dementia
  - Psychiatric disturbance
  - Onset usually in the third to sixth decade
  - About a 1/3 of patients develop migraine with aura-early sign

9. Clinical Features

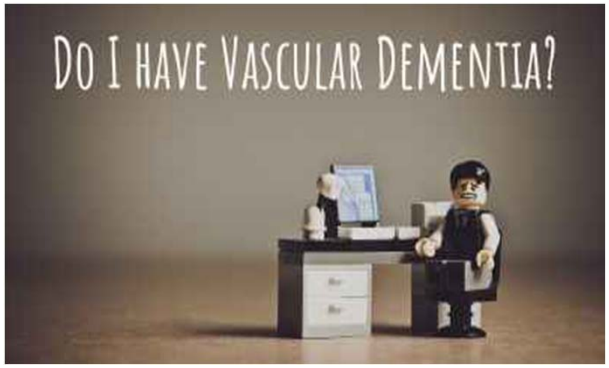


Features Associated with Dementia

- Agitation
- Aggression
- Sleep disturbances
- Apathy (can be misdiagnosed as depression)
- Depression or anxiety
- Personality changes

- Behavioral disinhibition
- Impaired insight
- Hallucinations
  (visual > auditory)
- Delusions (often paranoid or persecutory)

Clinical features consistent with Vascular Dementia:



- Early gait disturbances, frequent falls
- Parkinsonian features
- Early urinary symptoms
- Personality change, mood disorders (vascular depression), psychomotor retardation
- Predominant abnormal executive function

  (Affects subcortical & frontal lobes)
- Memory and language deficits less obvious & occur late
- higher risk for institutionalization than AD due to more Behavioural &Psychiatric symptoms

10. Clinical tools for Dementia

Mini Mental State Examination (MMSE)

Mini Mental State Exam

Please name the:
Year?
Season?
Date?
Day of Week?
Month?

Orientation to time /5

Where are we?
State?
City?
Suburb?
Hospital?
Floor/Ward?

Orientation to place /5

"I am now going to test your memory"
Name 3 objects. Ask them to repeat all 3.
1 Point for each object remembered. Repeat until learnt all 3 so that recall can be tested.

Registration /3
# of trials

Serial 7s
"please count backwards from 100 in sevens"
93, 86, 79, 72, 65

alternatively

Spell WORLD backwards
D L R O W

Attention and Calculation /5

"Please repeat the 3 objects I asked you to remember"

Recall /3

"Please name these objects"
Point to a wristwatch and a pencil

Naming /2

"Please repeat the following phrase"
"No ifs, ands or buts"

Repetition /1

"Please follow this command"
"Take this paper in your right hand, fold it in half and place it in your lap"

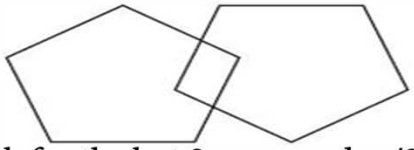
Complex command /3

Please read and obey the following command

CLOSE YOUR EYES

"Please write a sentence"
Must have a noun, verb and make sense

"Please copy the following drawing"



1 point each for the last 3 commands /3

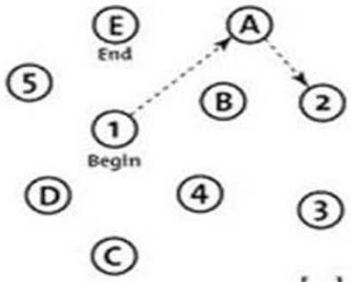
24-30-normal range
18-23-moderate cognitive impairment
0-17 -marked congnitive impairment

TOTAL /30

MONTREAL COGNITIVE ASSESSMENT (MOCA)

NAME :
Education :
Sex :
Date of birth :
DATE :

VISUOSPATIAL / EXECUTIVE



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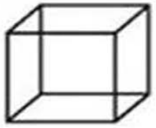


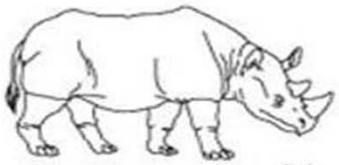
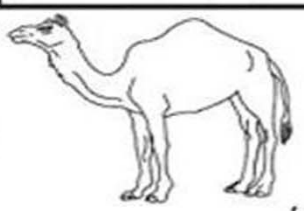
[ ] [ ]

Draw CLOCK (Ten past eleven) (3 points)

[ ] Contour [ ] Numbers [ ] Hands

POINTS ___/5

NAMING

[ ] [ ] [ ] ___/3

MEMORY Read list of words, subject must repeat them. Do 2 trials. Do a recall after 5 minutes.

	FACE	VELVET	CHURCH	DAISY	RED
1st trial					
2nd trial					

No points

ATTENTION Read list of digits (1 digit/ sec.). Subject has to repeat them in the forward order [ ] 2 1 8 5 4

Subject has to repeat them in the backward order [ ] 7 4 2 ___/2

Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 2 errors

[ ] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B ___/1

Serial 7 subtraction starting at 100 [ ] 93 [ ] 86 [ ] 79 [ ] 72 [ ] 65

4 or 5 correct subtractions: **3 pts**, 2 or 3 correct: **2 pts**, 1 correct: **1 pt**, 0 correct: **0 pt** ___/3

LANGUAGE Repeat : I only know that John is the one to help today. [ ]

The cat always hid under the couch when dogs were in the room. [ ] ___/2

Fluency / Name maximum number of words in one minute that begin with the letter F [ ] _____ (N ≥ 11 words) ___/1

ABSTRACTION Similarity between e.g. banana - orange = fruit [ ] train – bicycle [ ] watch - ruler ___/2

DELAYED RECALL

	Has to recall words WITH NO CUE	FACE [ ]	VELVET [ ]	CHURCH [ ]	DAISY [ ]	RED [ ]	Points for UNCUED recall only
Optional	Category cue						
	Multiple choice cue						

___/5

ORIENTATION [ ] Date [ ] Month [ ] Year [ ] Day [ ] Place [ ] City ___/6

 Version November 7, 2004

Normal ≥ 26 / 30

TOTAL ___/30

Add 1 point if ≤ 12 yr edu

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11. Management of Vascular Dementia

TREATMENT OF DEMENTIA

Primary Prevention of VaD

Target

- Brain at risk of CVD

Action (treatment of risk factors)

- Life style modification
- Arterial hypertension
- Cardiac abnormality
- Lipid abnormality : DIET, statins
- Diabetes mellitus
- Homocysteine

Secondary Prevention of VaD

Target

- CVD brain at risk of VCI/VaD

Action

- Treatment of acute stroke (rtPA)
- Prevention of stroke recurrence
- Slow progression of VaD related changes
- Treatment of vascular risk factors
- Neuroprotection ? Cerebrolysin, ?Citicoline

VCI = vascular congnitive impairment

Once Vascular Dementia is present,

- Acetyl cholinesterase inhibitors (AChEI) – may have mild - moderate benefit
- Memantine – may be useful adjunctive to AChEI in moderate - severe dementia
- Anti depressants (specifically SSRIs)
- Atypical antipsychotics
- No adequately controlled trials demonstrating pharmacologic efficacy for any agent in ischemic vascular (multi-infarct) dementia.

12. Take Home Messages

- Association between stroke and dementia is frequent and post stroke dementia adversely influences the outcome in stroke patients.
- Vascular dementia can be caused by both large and small vessel diseases.
- Small vessel disease can progress silently for many years before becoming clinically evident.
- Look for vascular risk factors and focal neurological signs
- Post stroke dementia is very important because appropriate control of vascular risk factors could lead to prevention
- Primary prevention depend on early identification and control of vascular risk factors
- Secondary prevention must include energetic therapy to prevent stroke recurrence.

SEE THE PERSON
NOT THE DEMENTIA

Q & A & Discussion

Thank You