CLASSIFICATION AND ETIOLOGY OF DEMENTIA

OUTLINE

- Introduction
- History
- Etiology
- Classification based on ICD-10
- Classification Based on DSM-IV
- Topographical Classification
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- Classification based on Age of onset
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INTRODUCTION

- Dementia refers to a disease process marked by progressive cognitive impairment in clear consciousness .
- Cognition is that operation of the mind process by which we become aware of objects of thought and perception, including all aspects of perceiving, thinking & remembering.
- Significant cognitive impairment in one or more of the domains of complex attention, executive function, learning and memory, language, perceptual motor ability, and social cognition.

INTRODUCTION

- Derived from the Latin word dementatus, meaning out of one's mind
- Incidence rate: 187/100,000 persons.
- Prevalence: moderate to severe dementia
  - 5% in the general population >65 yrs
  - 20-40% in the general population >85 yrs
- Male to female ratio is 0.6 to 0.8

COMMON SIGNS SYMPTOMS

- Memory loss
- Impaired judgement
- Difficult with abstract thinking
- Faulty reasoning
- Inappropriate behavior
- Loss of communication skills
- Disorientation to place & time
- Gait, motor & balance problems
- Neglect of personal care & safety
- Hallucinations, paranoia & agitation

HISTORY

- The word dementia derives from the Latin word dementatus, meaning out of one’s mind.
- Celsus probably first used the term dementia in the 1st century AD, although one of the first attempts to describe an etiology beyond old age was in the 4th century AD by Oribasius.
- It was not until the 19th century that the distinction between cognitive impairment due to dementia was separated from that caused by mental illness by Jean Etienne Dominique Esquirol
- Esquirol identified three varieties of dementia : Acute, chronic, and senile..

HISTORY

- In 1845, Wilhelm Griesinger describe senile dementia as a disease of the cerebral arteries.
- However, it was one of Griesinger's students, Emil Kraeplin, who differentiate senile dementia from psychoses with cerebral arteriosclerosis, which later came to be known as dementia praecox and, finally, as schizophrenia.
- In 1907, Alois Alzheimer was the first to identify specific histopathological changes associated with progressive degenerative dementia.
- He described two cases of dementia (in 1907 and 1911) characterized by symptoms of aphasia, apraxia, agnosia, and the histopathological finding of neurofibrillary tangles and milar foci (plaques) that distinguished it from dementia associated with cerebral arteriosclerosis.

ETIOLOGY

- **Primary:**
  - Diseases, injuries & insults that affect the brain directly or with predilection
  - Alzheimer's, Pick's, dementia with Lewy bodies, Parkinson's
- **Secondary:**
  - Systemic diseases/ disorders that attack the brain as one of multiple organs or systems of the body involved
  - HIV dementia, nutritional deficiency, metabolic

ETIOLOGY

Neurodegenerative	Alzheimer's disease
	Dementia with Lewy bodies
	Frontotemporal dementia
	Parkinson's disease
	Huntington's disease

- Significant loss of neurons and volume in brain regions devoted to memory and higher mental functioning.
- Neurofibrillary angles (twisted nerve cell fibers that are the damaged remains of microtubules)
- Environmental factors: infection, metals (zinc and copper in brain) and toxins.
- Deficiencies of vitamin B_6, B_{12} And Folate Possible Risk Factor Due To Increased Levels Of Hemo-cysteine.
- Early depression: common genetic factors seen

ETIOLOGY

Vascular	Infarction	Infectious	Human immunodeficiency disease
			Prion disease (Creutzfeldt-Jakob disease, bovine spongiform encephalitis, Gerstmann-Straüssler syndrome)
	Binswanger's disease		Neurosyphilis
	Hemodynamic insufficiency		Cryptococcus
		Metabolic	Hepatic insufficiency
Neurological disease	Multiple sclerosis		Renal insufficiency
	Normal-pressure hydrocephalus		Wilson's disease
			Metachromatic leukodystrophy
	Brain tumor (primary or metastatic)		Neuroacanthosis

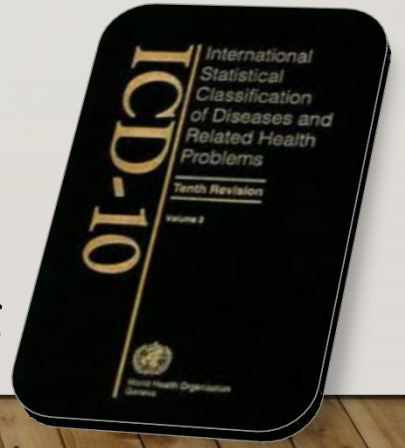
ETIOLOGY

Endocrine	Hypothyroidism
	Hypercalcemia
	Hypoglycemia
Nutritional	Vitamin B_{12} deficiency
	Thiamine deficiency
	Niacin deficiency

Traumatic	Subdural hematoma
	Dementia pugilistica
Exposure	Alcohol
	Heavy metals
	Irradiation
	Anticholinergic medications
	Carbon monoxide

CLASSIFICATION ICD 10

- Decline in memory- registration, storage and retrieval of new information
- Impairment of thinking, reasoning capacity and reduction in flow of ideas
- Impair personal activities of daily living
- Evident for at least 6 months

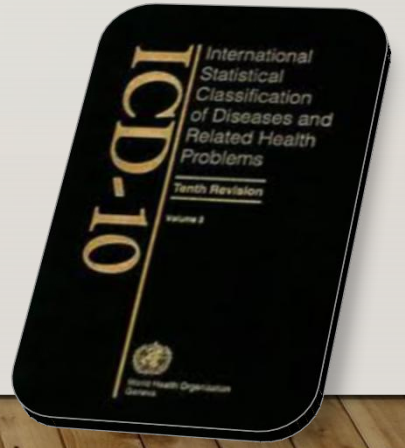


ICD 10

- F00 Dementia in Alzheimer’s disease
  - F00.0 with early onset
  - F00.1 with late onset
  - F00.2 atypical or mixed type
  - F00.9 unspecified

ICD 10

- F01 Vascular dementia
  - F01.0 Vascular dementia of acute onset
  - F01.1 Multi- infarct dementia
  - F01.2 Subcortical vascular dementia
  - F01.3 Mixed cortical and sub cortical
  - F01.8 Other vascular dementia
  - F01.9 Unspecified

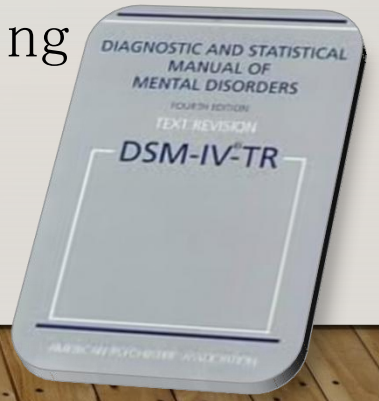


ICD 10

- F02 Dementia in other diseases classified elsewhere
  - F02.0 Dementia in Pick’s disease
  - F02.1 Dementia in Creutzfeldt-Jacob disease
  - F02.2 Dementia in Huntington’s disease
  - F02.3 Dementia in Parkinson’s disease
  - F02.4 Dementia in HIV disease
  - F02.8 Dementia in other diseases classifi here
- F03 Unspecified dementia

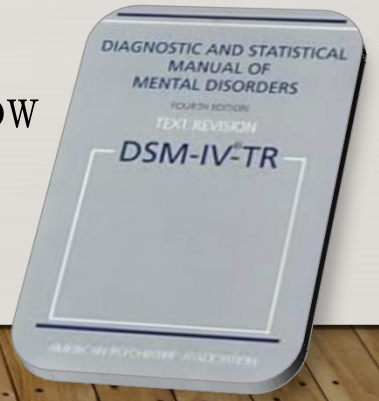
CLASSIFICATION DSM IV TR

- Multiple cognitive deficits including memory impairment
- Plus at least one of: aphasia, apraxia, agnosia or disturbance in executive functioning
- Sufficiently severe to cause impairment in occupational or social functioning
- Decline from previously higher level of functioning
- Exclude delirium



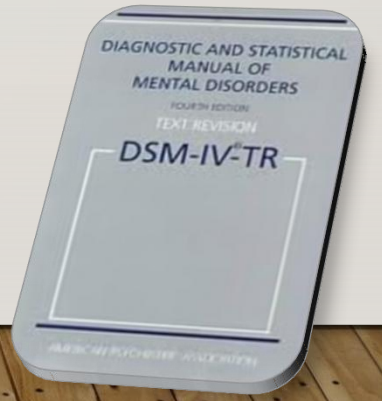
DSM IV TR

- 294.1x Dementia of Alzheimer’s type
  - 294.10 without behavioral disturbance
  - 294.11 with behavioral disturbance
- Specify subtype:
  - With early onset: onset is at 65yrs or below
  - With late onset: onset after age 65 yrs



DSM IV TR

- 290.4x Vascular dementia
  - 290.41 with delirium
  - 290.42 with delusions
  - 290.43 with depressed mood
  - 290.40 uncomplicated
- Specify: with behavioral disturbances

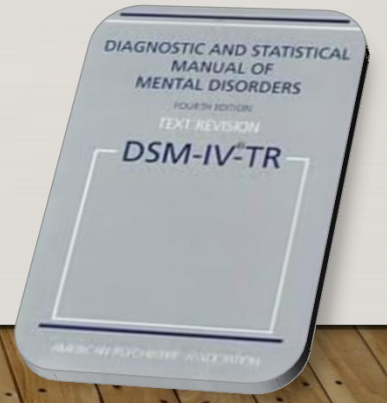


DSM IV TR

Dementia due to General medical conditions:

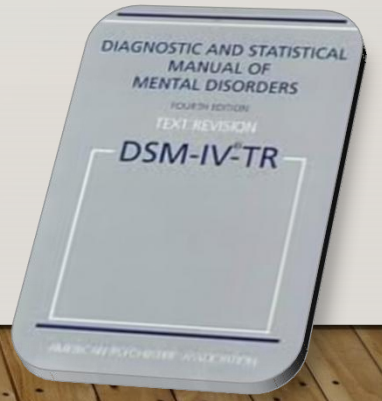
- .10 without behavioral disturbance
- .11 with behavioral disturbance

- 294.1x Dementia due to HIV Disease
- 294.1x Dementia due to Head trauma
- 294.1x Dementia due to Parkinson’s disease
- 294.1x Dementia due to Huntington’s disease
- 294.1x Dementia due to Pick’s disease
- 294.1x Dementia due to CJD
- 294.1x Dementia due to other GMC



DSM IV TR

- Dementia due to substance use
- Dementia due to multiple etiologies
- 294.8 Dementia NOS



TOPOGRAPHICAL CLASSIFICATION

- Cortical
  1. Frontotemporal dementias
  2. Temporoparietal dementias,
  3. Occipital dementias.
- Sub cortical
  1. axial syndrome, of which the main model is Korsakoff's syndrome,
  2. a syndrome arising from lesions of the basal ganglia.
- Mixed

TOPOGRAPHICAL CLASSIFICATION

SUBCORTICAL	CORTICAL
No aphasia	Aphasia early
Impaired recall> recognition	Recall = recognition
Calculation preserved late	Involved early
Executive function disproportionately affected	Consistent with other involvement
Cognitive processing slowed early	Normal till late in disease
Personality apathetic	Unconcerned
Mood depressed	Euthymic
Speech dysarthric	Articulate until late
Posture bowed	Upright
Coordination impaired	Normal until late
Motor speed slowed	Normal
Chorea, tremor, tics, dystonia	absent

CLASSIFICATION BASED ON SEVERITY

Mild dementia:

- Consistent forgetfulness that is more marked for recent events
- Inability to function effectively in interests and more complex activities (work, community, home, social activities)
- Maintained social judgment
- May require prompting to perform activities of daily living he or she is able to complete independently these tasks

CLASSIFICATION BASED ON SEVERITY

Moderate dementia:

- Short-term memory is poor
- Long-term memory may be only slightly affected
- Impaired social judgment
- Cannot perform independently outside of the home
- Activities in the home are usually limited to simple chores
- Interests are severely curtailed

CLASSIFICATION BASED ON SEVERITY

Severe dementia:

- Severe memory loss-Severe deficits in long-term short-term memory
- Disorientation usually to time and place
- Inability to **independently function** inside or outside of the home,
- Requirement of help with activities of daily living (toileting, bathing, and eating)
- Possible incontinence

CLASSIFICATION BASED ON SEVERITY

Profound dementia:

- Patient is unintelligible & unable to follow simple commands
- Incontinent
- **Unable to ambulate** or to accomplish purposeful tasks
- May be bedbound, **unresponsive, have swallowing difficulties and contractures.**

BASED ON REVERSIBILITY

Reversible/ Treatable dementias:

- 5% of dementias
- Causes:
  - Metabolic: hypothyroidism, hypoparathyroidism
  - Normal pressure hydrocephalus
  - Nutritional deficiencies: vitamin B_{12} or folate deficiencies
  - Tumor or other space-occupying lesion-chronic SDH
  - Infection: syphilis, AIDS
  - Drugs: any drug with anticholinergic activity
  - Emotional: depression

BASED ON REVERSIBILITY

- Progressive /irreversible dementia:
  - Alzheimer disease
  - Vascular dementia
  - Dementia with lewy bodies
  - Fronto-temporal dementia
  - Huntington’s disease

BASED ON AGE OF ONSET

- **Senile dementia:**
  - Onset after age 65 yrs
  - Eg: Alzheimer’s disease

- **Presenile dementia:**
  - onset before age 65 yrs
  - Eg: Pick’s, Huntington’s, HIV dementia

PSEUDODEMENTIA	DEMENTIA
• Onset well demarcated	• Indistinct
• History short	• Long history
• Rapidly progressive	• Initially unnoticed
• H/o previous psychiatric difficulty or recent crisis	• Uncommon
• C/o **cognitive** function	• Little c/o cognitive loss
• **Affective** change present	• Apathetic, shallow emotions
• **Behavior** unaffected	• Compatible with memory loss
• No nocturnal exacerbation	• Nocturnal accentuation
• Inconsistent **memory loss**	• Tries items, struggles with tasks
• Specific memory gaps	• Recent>remote, consistent
	• No specific memory gaps

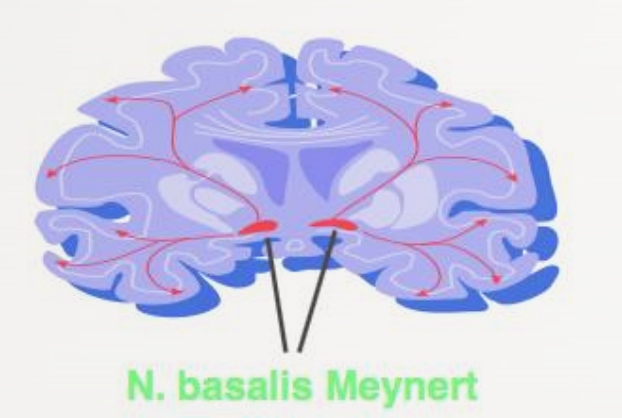
ALZHEIMER'S DISEASE

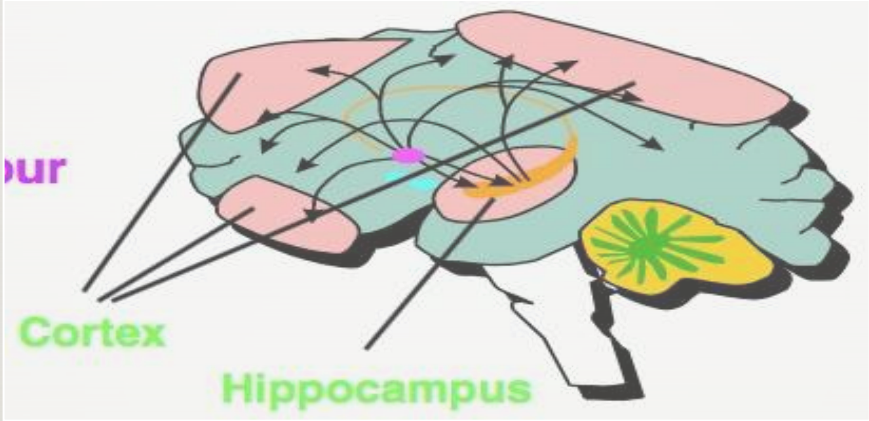
TABLE 10.2. *Criteria for Diagnosis of Probable Alzheimer's Disease*[6]

1. Dementia present
2. Onset between 40 and 90 years of age
3. Deficits in two or more cognitive areas
4. Progression of deficits >6 months
5. Consciousness undisturbed
6. Absence of other potential etiology

- Most common type of dementia; accounts for an estimated 60 to 80 percent of cases.
- Autosomal dominant condition.
- Dementia of the Alzheimer's type is defined as a dementia syndrome that is gradual in onset and progression and without another identifiable and sometimes treatable cause.

PATHOPHYSIOLOGY OF DEMENTIA





- Cholinergic deficit
- Progressive loss of cholinergic neurons
- \- progressive decrease in available ACh
- \- impairment in ADL, behaviour and cognition

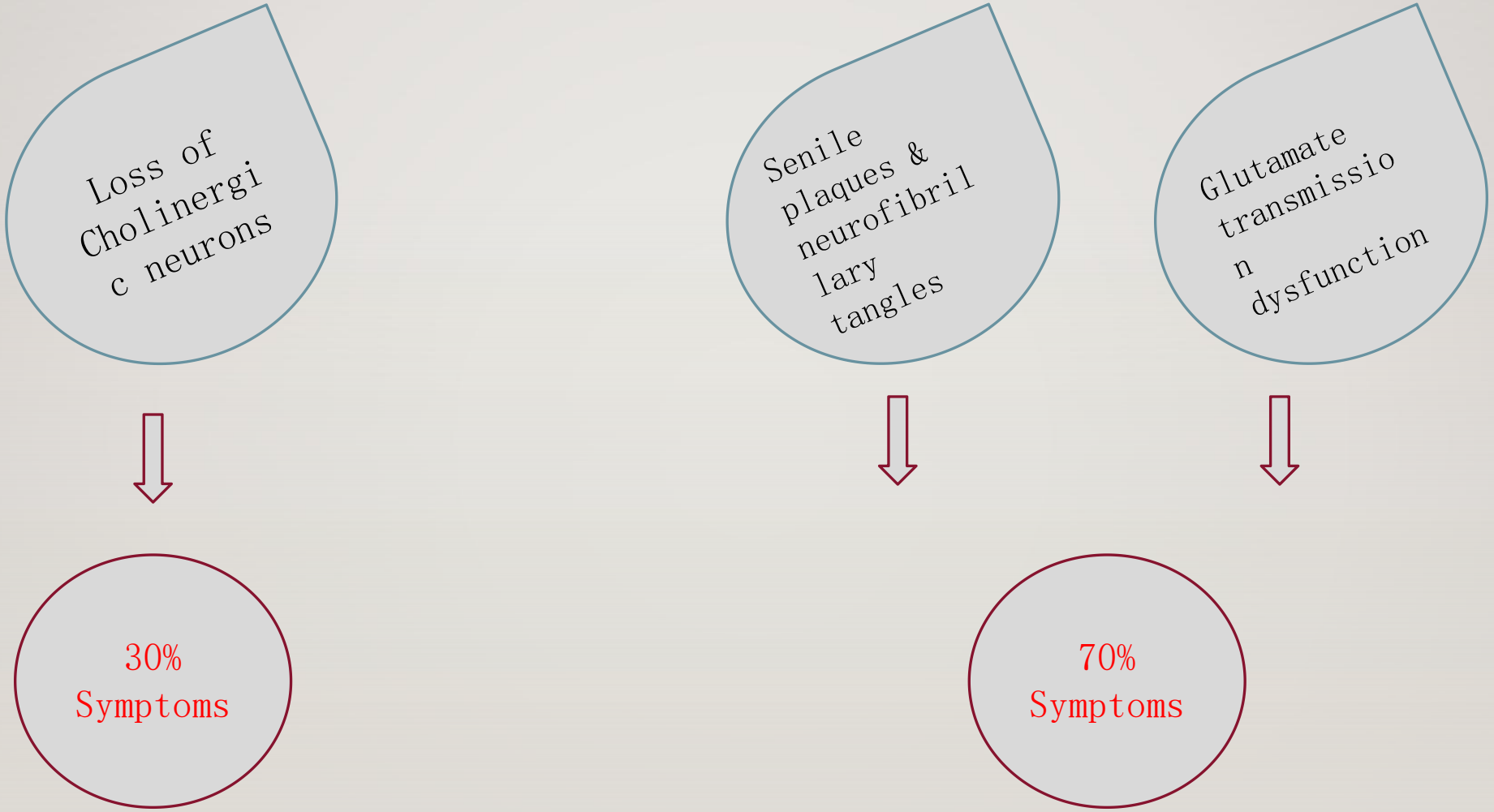
Decreased Ch. Neurons

Decreased Ch. uptake

Decreased Ach. Release

Decreased Receptors

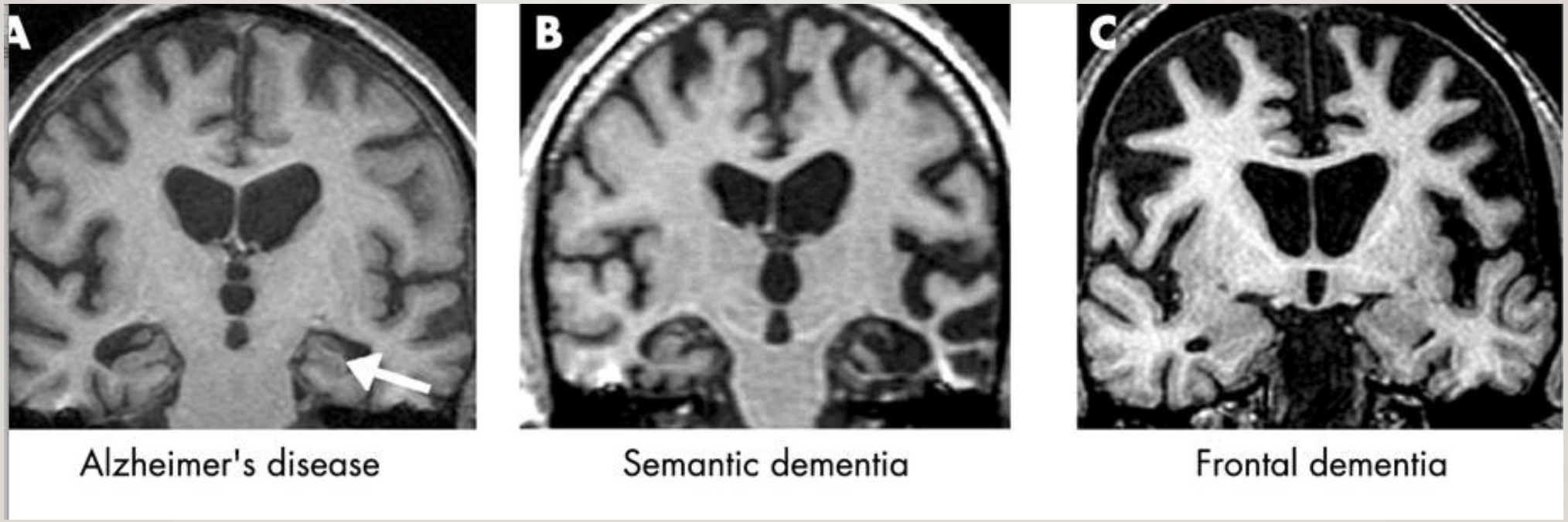
In Alzheimer Disease



ALZHEIMER'S DISEASE

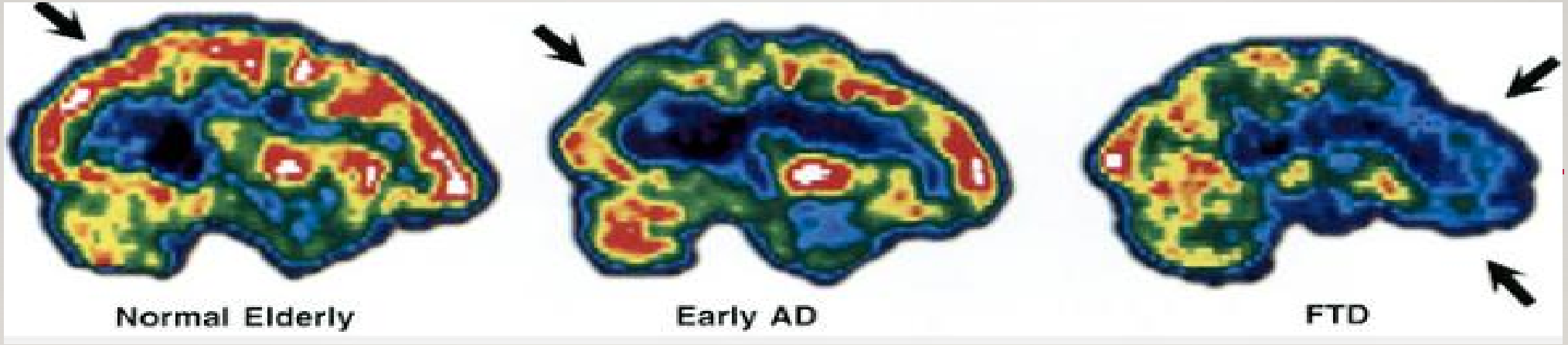
- **Symptoms:** Difficulty remembering recent conversations, names or events is often an early clinical symptom; apathy and depression are also often early symptoms. Later symptoms include impaired communication, poor judgment, disorientation, confusion, behavior changes and difficulty speaking, swallowing and walking.
- **Brain changes:** Hallmark abnormalities are deposits of the protein fragment beta-amyloid (plaques) and twisted strands of the protein tau (tangles) as well as evidence of nerve cell damage and death in the brain.

ALZHEIMER'S DISEASE



FRONTOTEMPORAL DEMENTIA

- Includes dementias such as behavioral variant FTD (bvFTD), primary progressive aphasia, Pick's disease, corticobasal degeneration and progressive supranuclear palsy.
- **Symptoms:** Typical symptoms include changes in personality and behavior and difficulty with language. Nerve cells in the front and side regions of the brain are especially affected.
- **Brain changes:** No distinguishing microscopic abnormality is linked to all cases. People with FTD generally develop symptoms at a younger age (at about age 60) and survive for fewer years than those with Alzheimer's.



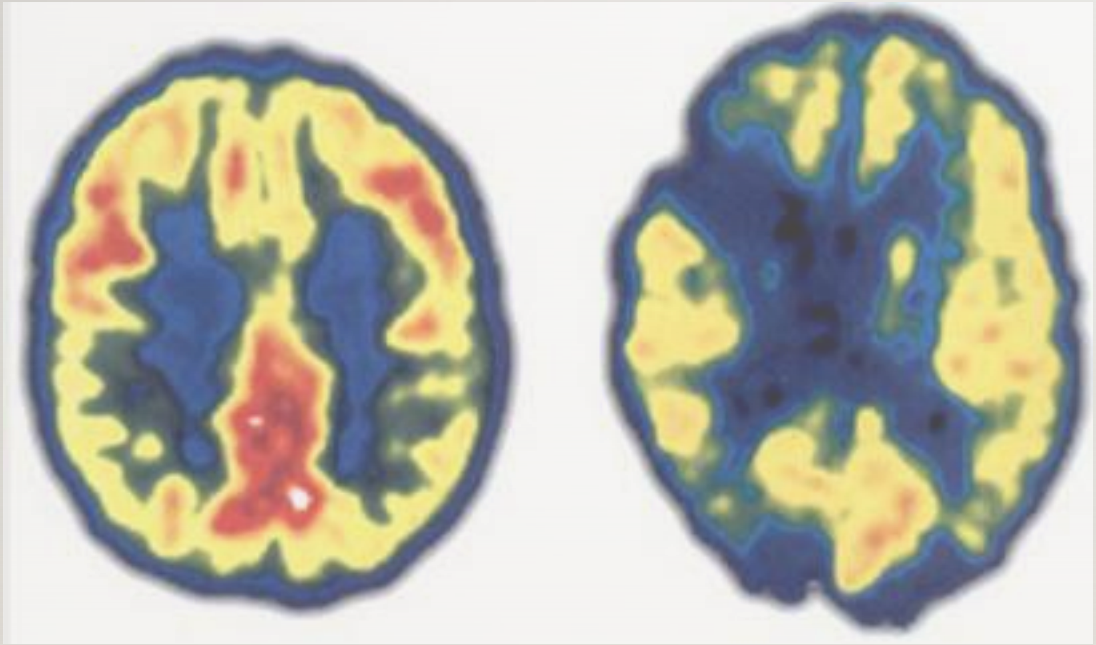
Fluorodeoxyglucose positron emission tomography (FDG-PET) scans :-->Normal elderly control *(left)*
>Early Alzheimer's disease (AD) *(middle)*
>frontotemporal dementia (FTD) *(right).*

Note the presence of a metabolic defect in the posterior parietal cortex in the AD patient, but realtively preserved frontal metabolism

VASCULAR DEMENTIA

- Previously known as multi-infarct or post-stroke dementia, accounting for about 10 % of dementia cases.
- Occurs from blood vessel blockage or damage leading to infarcts (strokes) or bleeding in the brain.
- **Symptoms:** Impaired judgment or ability to make decisions, plan or organize is more likely to be the initial symptom.
- **Brain changes:** Brain imaging can often detect blood vessel problems implicated in vascular dementia.

VASCULER DEMENTIA



Fluorodeoxyglucose positron emission tomography (FDG-PET) scans

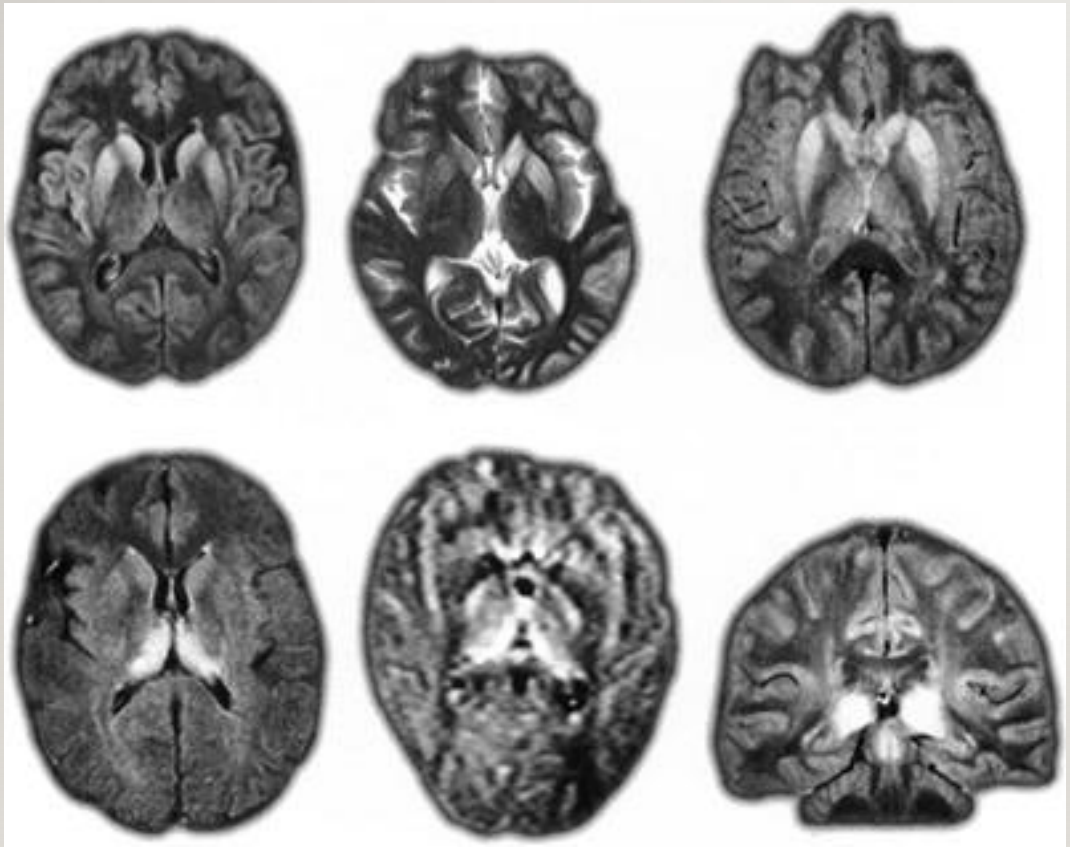
>Normal elderly control *(left)*

>Multiple cerebral vascular lesions *(right).*

CREUTZFELDT JAKOB DISEASE

- CJD is the most common human form of a group of rare, fatal brain disorders affecting people and certain other mammals.
- Variant CJD (“mad cow disease”) occurs in cattle, and has been transmitted to people under certain circumstances.
- **Symptoms:** Rapidly fatal disorder that impairs memory and coordination and causes behavior changes.
- **Brain changes:** Results from misfolded prion protein that causes a "domino effect" in which prion protein throughout the brain mis folds and thus malfunctions.

PRION DISEASES



- Different manifestations of sporadic Creutzfeldt-Jakob disease (CJD) on structural imaging studies demonstrating striatal pathology (*top row*) on T_1-W, T_2-W MRI, and proton-dense MRI, from left to right. Thalamic involvement in the variant form of CJD (vCJD) on MRI
- Prion disease is shown *(bottom row)* on computed assisted tomography and T_2 MRI

DEMENTIA WITH LEWY BODIES DLB

- **Symptoms:** Memory loss and thinking problems similar to Alzheimer's, but as compared to Alzheimer's, patients have initial/early symptoms such as sleep disturbances, well-formed visual hallucinations, and slowness, gait imbalance or other parkinsonian movement features.
- **Brain changes:** Lewy bodies - abnormal aggregations of the protein alpha-synuclein. Accumulation of alpha-synuclein in the cortex results in dementia.

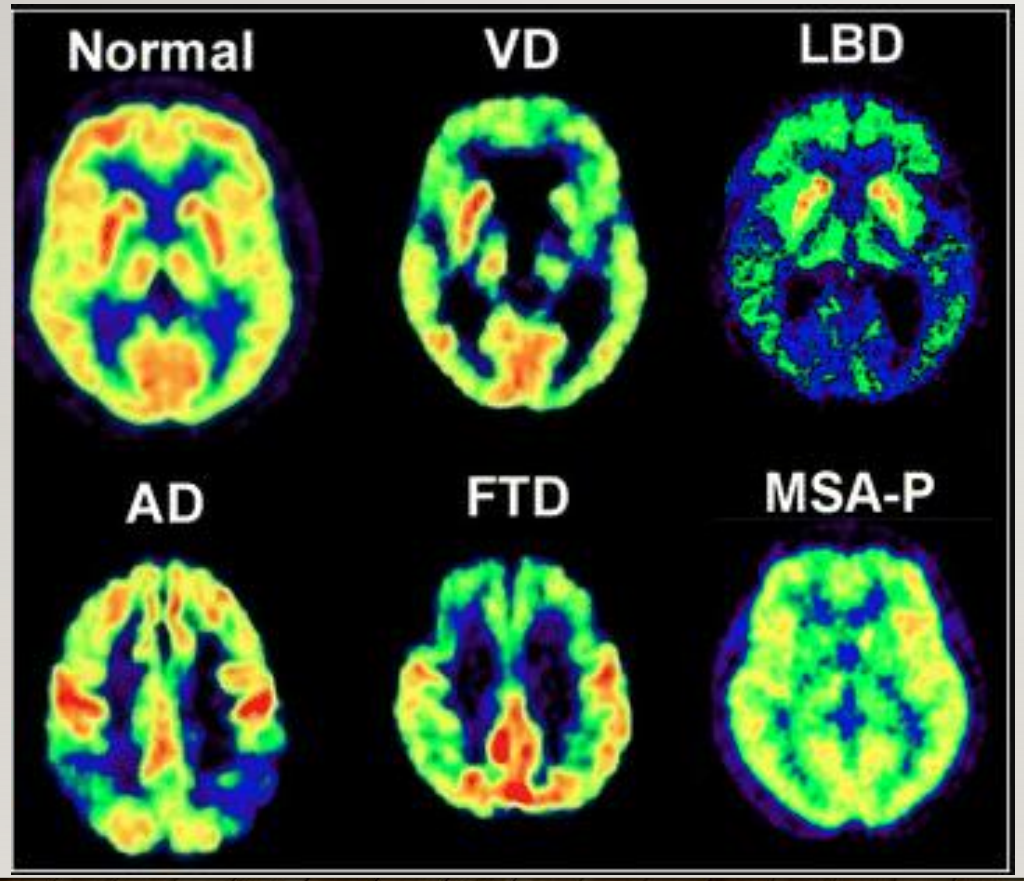
MIXED DEMENTIA

- In mixed dementia abnormalities linked to more than one cause of dementia occur simultaneously in the brain. Recent studies suggest that mixed dementia is more common than previously thought.
- **Brain changes:** Characterized by the hallmark abnormalities of more than one cause of dementia —most commonly, Alzheimer's and vascular dementia, but also other types, such as dementia with Lewy bodies.

NORMAL PRESSURE HYDROCEPHALUS

- **Symptoms:** Symptoms include difficulty walking, memory loss and inability to control urination.
- **Brain changes:** Caused by the buildup of fluid in the brain.
  - Can sometimes be corrected with surgical installation of a shunt in the brain to drain excess fluid.

METABOLIC PATTERNS FOR DIFFERENT TYPES OF DEMENTIA



Metabolic patterns for different types of dementia

>Vascular dementia (VD).

>Alzheimer’s disease (AD)

>Frontotemporal dementia (FTD)

>Lewy-Body dementia (LBD)

Distinct cortical patterns of decreased metabolism, while multisystem atrophy type P (MSA-P) shows a decreased metabolism in the putamen on both sides. In contrast, a typical feature of VD is the simultaneous occurrence of patchy,

HUNTINGTON'S DISEASE

- Huntington's disease is a progressive brain disorder caused by a single defective gene on chromosome 4.
- **Symptoms:** Include abnormal involuntary movements, a severe decline in thinking and reasoning skills, and irritability, depression and other mood changes.
- **Brain changes:** The gene defect causes abnormalities in a brain protein that, over time, lead to worsening symptoms.

PARKINSON'S DISEASE

- As Parkinson's disease progresses, it often results in a progressive dementia similar to dementia with Lewy bodies or Alzheimer's.
- **Symptoms:** Problems with movement are common symptoms of the disease. If dementia develops, symptoms are often similar to dementia with Lewy bodies.
- **Brain changes:** Alpha-synuclein clumps are likely to begin in an area deep in the brain called the substantia nigra. These clumps are thought to cause degeneration of the nerve cells that produce dopamine

WERNICKE KORSAKOFF SYNDROME

- Korsakoff syndrome is a chronic memory disorder caused by severe deficiency of thiamine (vitamin B-1). The most common cause is alcohol misuse.
- **Symptoms:** Memory problems may be strikingly severe while other thinking and social skills seem relatively unaffected.
- **Brain changes:** Thiamine helps brain cells produce energy from sugar. When thiamine levels fall too low, brain cells cannot generate enough energy to function properly.

summery

- Dementia refers to a disease process marked by progressive cognitive impairment in clear consciousness.
- Memory loss, Impaired judgement, Difficult with abstract thinking, Faulty reasoning, Inappropriate behavior, Loss of communication skills, Disorientation to place & time, Gait, motor & balance problems, Neglect of personal care & safety, Hallucinations, paranoia & agitation are common symptoms Vary from person to person.
- Caused of Dementia is Multifactorial can be Neurodegenerative, Vascular, Neurologic disease, Endocrine, Nutritional, Infectious, Metabolic, Traumatic, Exposure.
- Dementia can be Cortical, Sub cortical, Mixed Leading to memory impairment, speech disturbances, impaired coordination.

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