

Chapter 15

Neurocognitive Disorders

Outline

Delirium

- Clinical Description and Statistics
- Treatment and Prevention

Major and Mild Neurocognitive Disorders

- Clinical Description and Statistics
- Neurocognitive Disorder Due to Alzheimer's Disease
- Vascular Neurocognitive Disorder
- Other Medical Conditions That Cause Neurocognitive Disorder
- Substance/Medication-Induced Neurocognitive Disorder
- Causes of Neurocognitive Disorder
- Treatment and Prevention





Memory Quiz

1. Which color is on top of a stoplight?
2. Whose image is on a penny?
3. Is he wearing a tie?
4. What five words besides “In God We Trust” appear on most U.S. coins?
5. When water goes down the drain, does it swirl clockwise or counterclockwise?
6. What letters, if any, are missing on a telephone dial?

1. Which color is on top of a stoplight? (*Answer: red*)
2. Whose image is on a penny? (*Answer: Lincoln*);
3. Is he wearing a tie? (*Answer: yes, a bow tie*)
4. What five words besides “In God We Trust” appear on most U.S. coins? (*Answer: United States of America and Liberty*)
5. When water goes down the drain, does it swirl clockwise or counterclockwise? (*Answer: counterclockwise in the Northern Hemisphere; clockwise in the Southern Hemisphere*)
6. What letters, if any, are missing on a telephone dial? (*Answer: Q, Z*)

Neurocognitive Disorders: An Overview



- Affect learning, memory, and consciousness
- Most develop later in life
- Types of neurocognitive disorders
 - Delirium – temporary confusion and disorientation
 - Major or mild neurocognitive disorder – broad cognitive deterioration affecting multiple domains
 - Amnestic – refers to problems with memory that may occur in neurocognitive disorders
- Shifting DSM perspectives
 - From “organic” mental disorders to “cognitive” disorders
 - Broad impairments in cognitive functioning
 - Cause profound changes in behavior and personality
 - Thus, although some may consider these to be general medical conditions, often best treated by mental health professionals

Delirium: An Overview

- Nature of delirium
 - Central features – impaired consciousness and cognition
 - Develops rapidly over several hours or days
 - Appear confused, disoriented, and inattentive
 - Marked memory and language deficits
 - Designer drugs such as Ecstasy, “Molly,” and “bath salts” can cause substance-induced delirium
- Symptoms were written more than 2,400 years ago



Delirium: An Overview, Continued



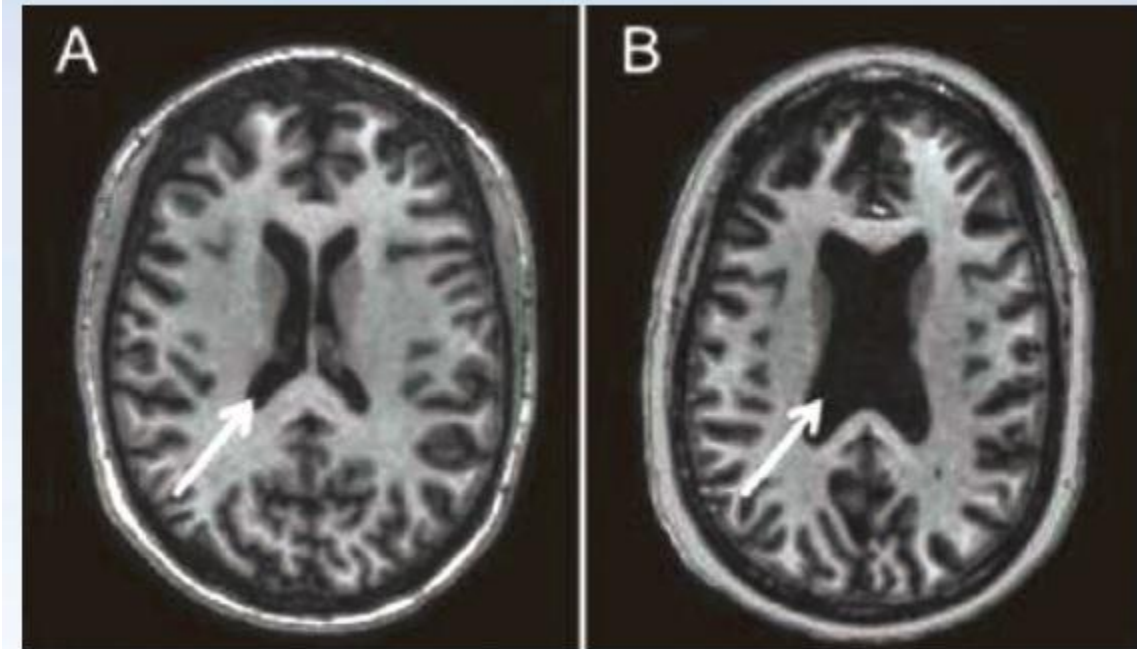
- Facts and statistics
 - Affects up 20% of adults in acute care facilities (e.g., ER)
 - More prevalent in certain populations, including:
 - Older adults
 - Those undergoing medical procedures
 - AIDS patients and cancer patients
 - People in hospitals/critical care
 - Full recovery often occurs within several weeks



Medical Conditions Related to Delirium

- Medical conditions
 - Dementia (50% of cases involve temporary delirium)
 - Drug intoxication, poisons, withdrawal from drugs
 - Infections
 - Head injury and several forms of brain trauma
 - Sleep deprivation, immobility, and excessive stress

Figure 2. Delirium and brain atrophy



(A) 46 years old,
no delirium

(B) 42 years old,
12 days of delirium

Treatment and Prevention of Delirium

- Treatment
 - Attention to underlying causes
 - Psychosocial interventions
 - Reassurance/comfort, coping strategies, inclusion of patients in treatment decisions
- Prevention
 - Address proper medical care for illnesses, proper use, and adherence to therapeutic drugs



Major and Mild Neurocognitive Disorders

- Nature of dementia
 - Gradual deterioration of brain functioning
 - Deterioration in judgment and memory
 - Deterioration in language / advanced cognitive processes
 - Has many causes and may be irreversible



Major and Mild Neurocognitive Disorders: DSM Criteria

- Major neurocognitive disorder:
 - The new DSM-5 term for dementia
 - Individual is **not able** to function independently
- Mild neurocognitive disorder:
 - New DSM-5 classification for early stages of cognitive decline
 - Individual **is able** to function independently with some accommodations (e.g., reminders/lists)

Major Neurocognitive Disorder: DSM-5

- DSM-5 criteria

One or more cognitive deficits that represent a decrease from previous functioning

- complex attention,
- executive function,
- learning and memory,
- language,
- perceptual-motor,
- social cognition

Interfere with daily independent activities



Major Neurocognitive Disorder Prevalence and Statistics

- Prevalence and statistics
 - New case identified every 7 seconds
 - 5% prevalence in adults 65+; 20% prevalence in adults 85+
 - 5 million people
 - Methodology for estimating number of those suffering from major neurocognitive disorder has resulted in diverging numbers
 - Dramatic rise in Alzheimer's predicted through 2050; more people expected to live > 85 years

Major Neurocognitive Disorder: Early Stages

- Initial stages

- Memory and visuospatial skills impairments
- Facial agnosia – inability to recognize familiar faces
- Other symptoms
 - Delusions, apathy, depression, agitation, aggression

- Later stages

- Cognitive functioning continues to deteriorate
- Total support is needed to carry out day-to-day activities
- Increased risk for early death due to inactivity and onset of

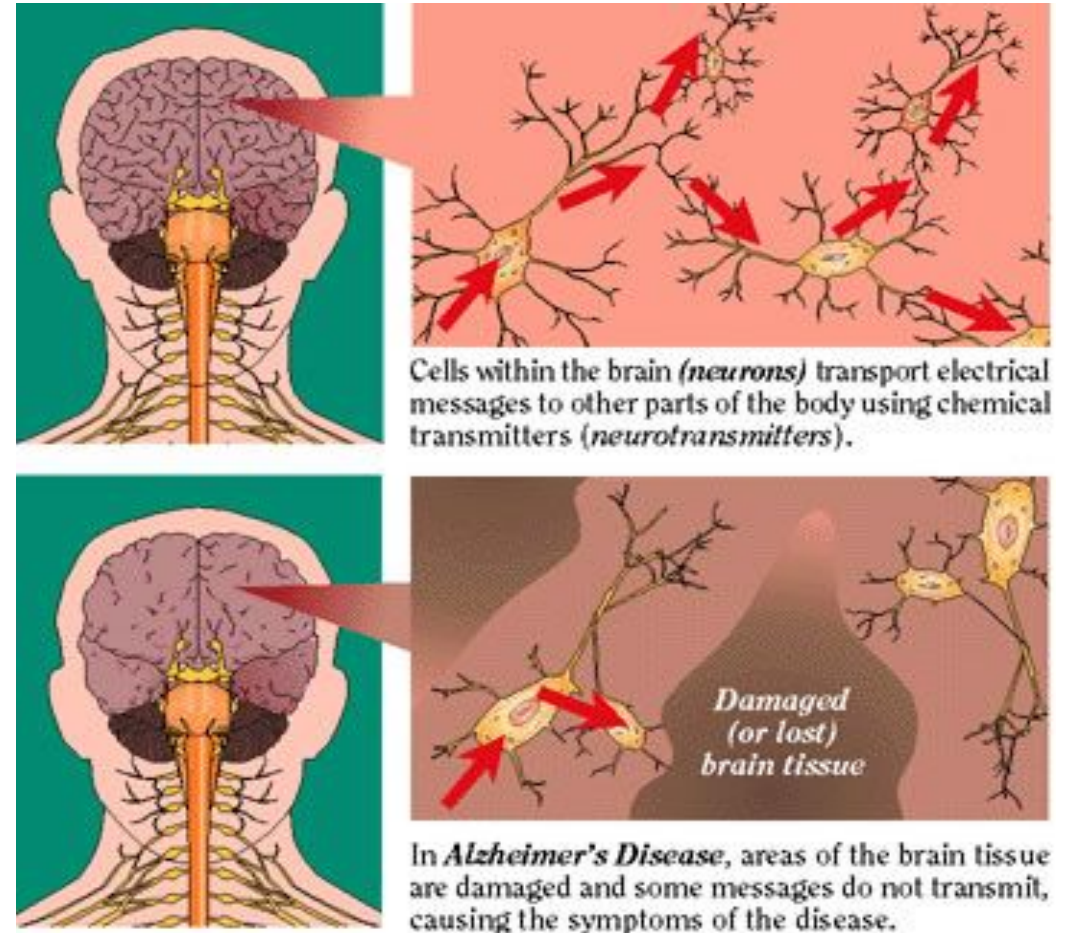


DSM-5 Types of Major and Mild Neurocognitive Disorder

- Due to Alzheimer's Disease
- Frontotemporal
- Vascular
- With Lewy bodies
- Due to traumatic brain injury
- Substance/medication induced
- Due to HIV infection
- Due to prion disease
- Due to Parkinson's Disease
- Due to Huntington's disease
- Due to another medical condition
- Due to multiple etiologies
- Unspecified

Neurocognitive Disorder Due to Alzheimer's Disease

- Accounts for nearly half of neurocognitive disorders
- Clinical Features
 - Typically develop gradually and steadily
 - Memory, orientation, judgment, and reasoning deficits
 - Additional symptoms may include
 - Agitation, confusion, or combativeness
 - Depression and/or anxiety



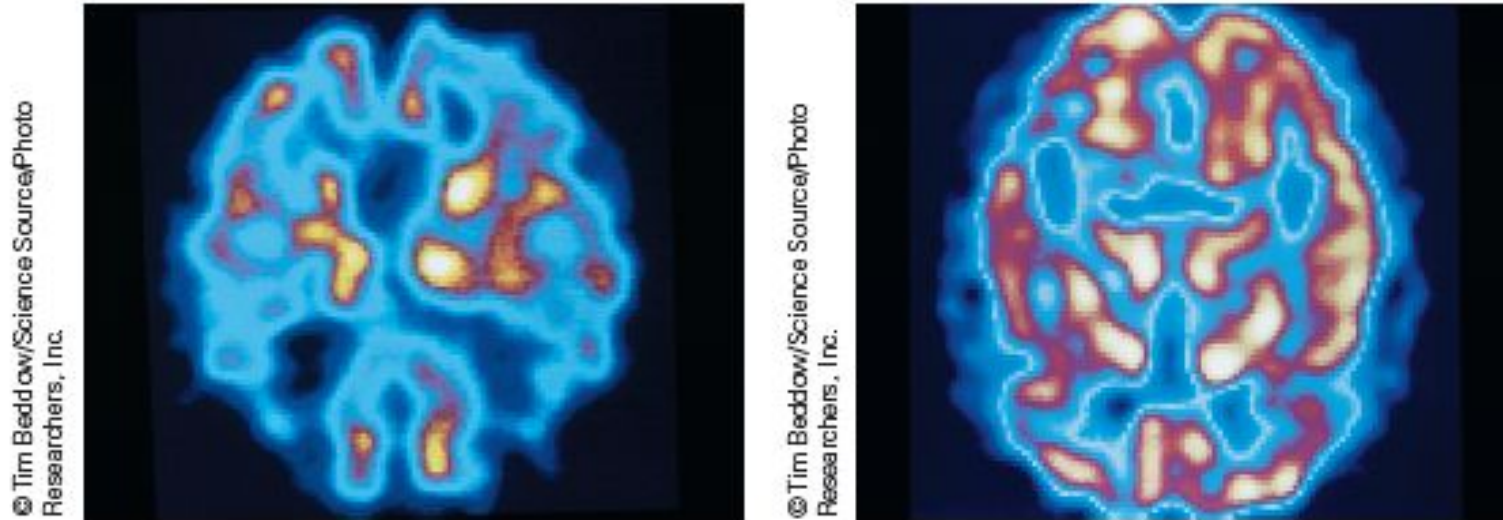
Causes of Neurocognitive Disorder: The Example of Alzheimer's Disease, Continued

- Multiple genes are involved in Alzheimer's disease
- Include genes on chromosomes 21, 19, 14, 12
- Chromosome 14
 - Associated with early onset Alzheimer's
- Chromosome 19
 - Associated with late onset Alzheimer's

Causes of Neurocognitive Disorder: The Example of Alzheimer's Disease, Part 3

- Deterministic genes
 - Rare genes that inevitably lead to Alzheimer's
 - Beta-amyloid precursor gene
 - Presenilin-1 and Presenilin-2 genes
- Susceptibility genes
 - Make it more likely but not certain to develop Alzheimer's

PET Scans of Alzheimer's Vs. Normal Brain

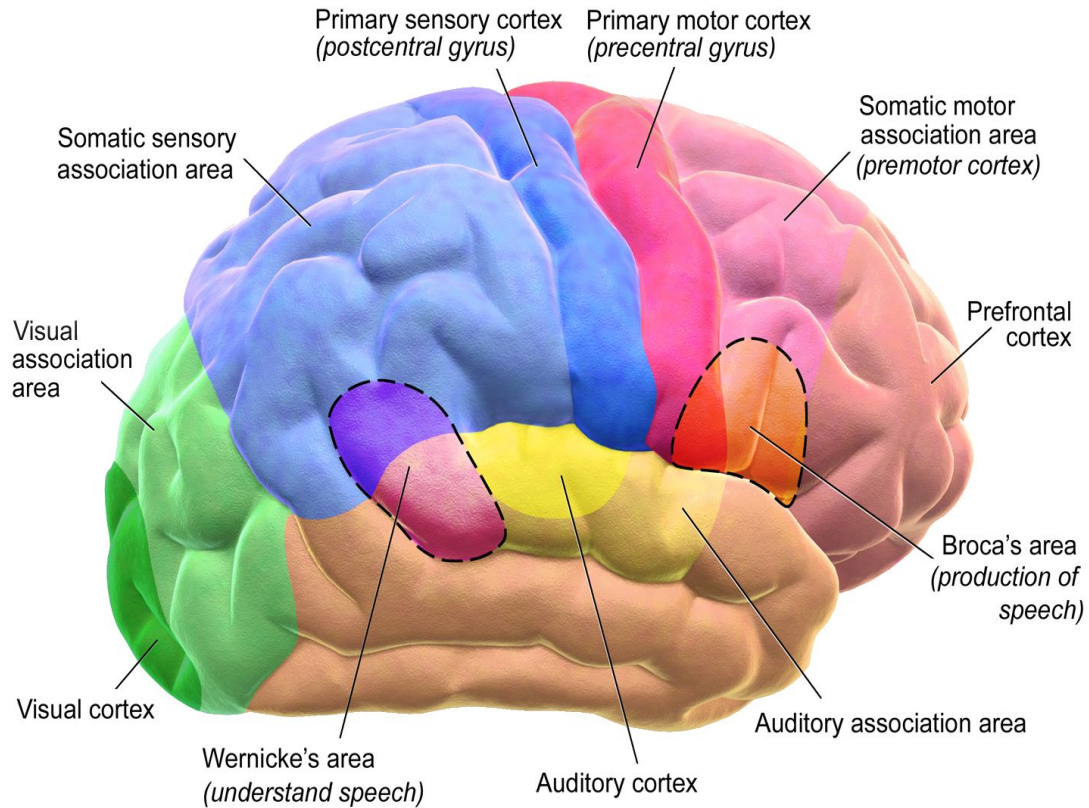


▲ The PET scan of a brain afflicted with Alzheimer's disease (left) shows significant tissue deterioration in comparison with a normal brain (right).

Causes of Neurocognitive Disorder: The Example of Alzheimer's Disease

- Features of brains with Alzheimer's disease
 - Neurofibrillary tangles (strandlike filaments)
 - Amyloid plaques (gummy deposits between neurons)
 - Brains of Alzheimer's patients tend to atrophy

Alzheimer's Disorder: Extent of Deficits



- Range of cognitive deficits
 - Aphasia – difficulty with language
 - Apraxia – impaired motor functioning
 - Agnosia – failure to recognize objects
- Difficulties with
 - Planning, Organizing
 - Sequencing
 - Abstracting information

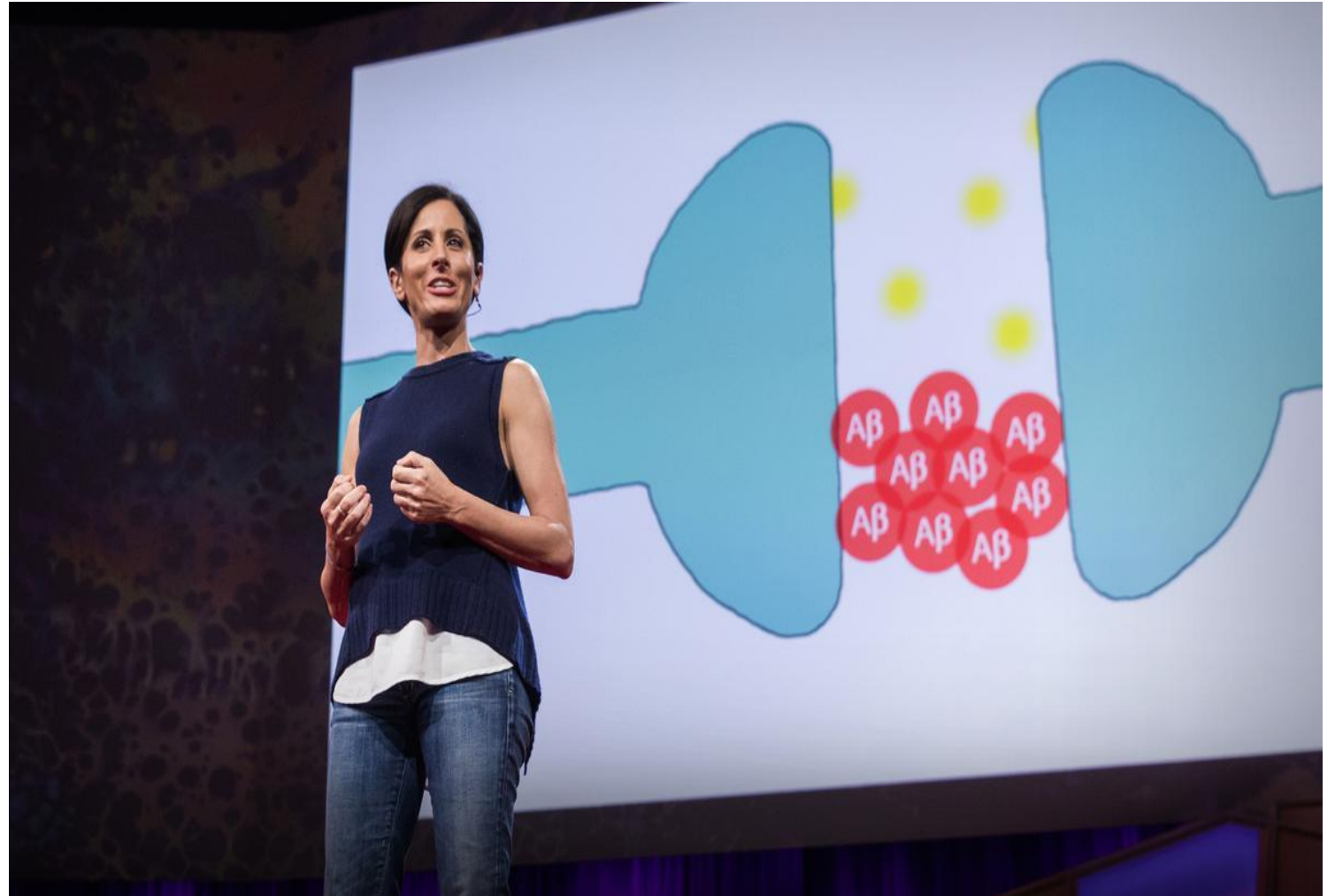
Neurocognitive Disorder Due to Alzheimer's Disease : Statistics

- Early and later stages = slow
- During middle stages = rapid
- Post-diagnosis survival = 8 years
- Onset = 60s or 70s (“early onset” = 40s to 50s)
- 50% of the cases of neurocognitive disorder result from Alzheimer's disease



Lisa Genova: Cognitive reserve

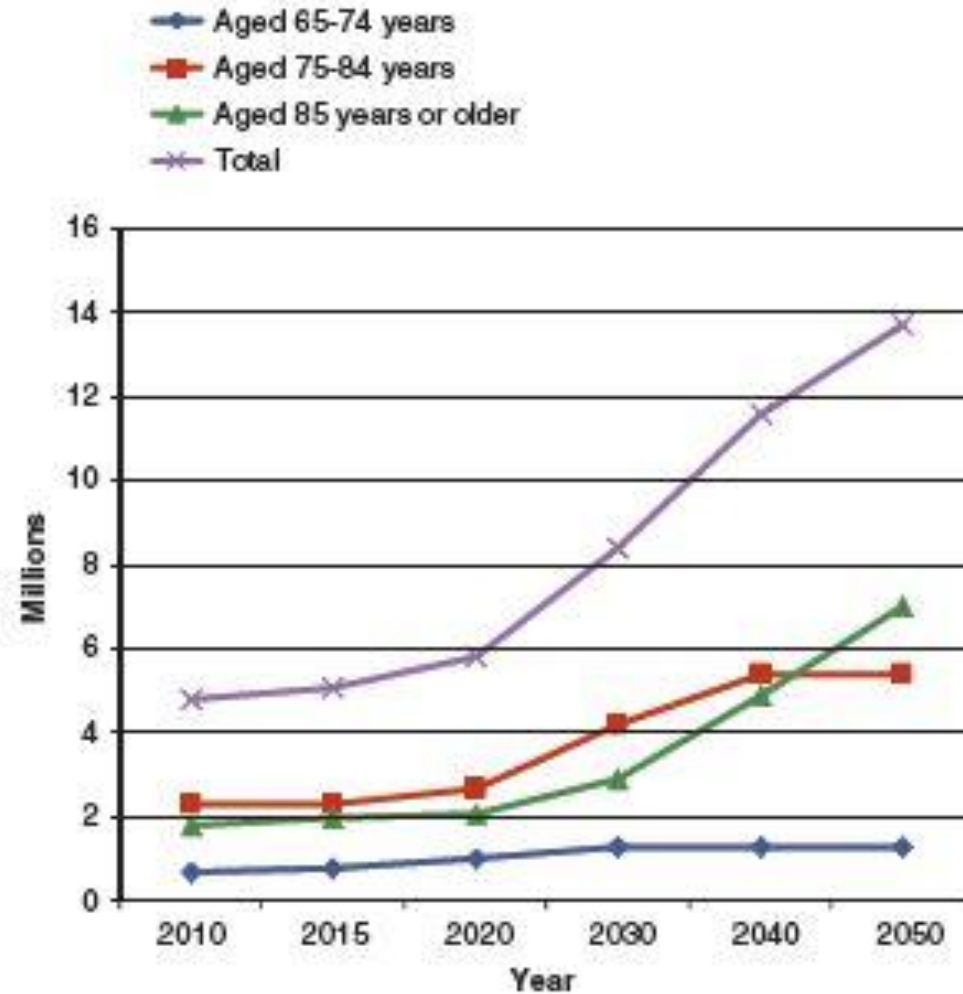
- **Cognitive reserve** also indicates a resilience to neuropathological damage, but the emphasis here is in the way the brain uses its damaged resources. It could be defined as the ability to optimize or maximize performance through differential recruitment of brain networks and/or alternative **cognitive** strategies.



Neurocognitive Disorder Due to Alzheimer's Disease : Prevalence

- Prevalence
 - More common in less educated individuals
 - *More* educated individuals decline more rapidly after onset; this suggests that education provides a buffer period of better initial coping
 - Slightly more common in women
 - Possibly because women lose estrogen as they age; estrogen may be protective

Graph of Predicted Alzheimer's Incidence



Nature and progression of the disease

“Nun study” – analysis of nuns’ journal writing over many years shows patterns of deterioration

The Nun Study (Danner et al., 2001)

- Only positive feelings predicted longevity

Age 85: 90% of most cheerful quartile alive;
34% of least cheerful quartile alive.

Age 94: 54% of most cheerful quartile alive;
11% of least cheerful quartile alive



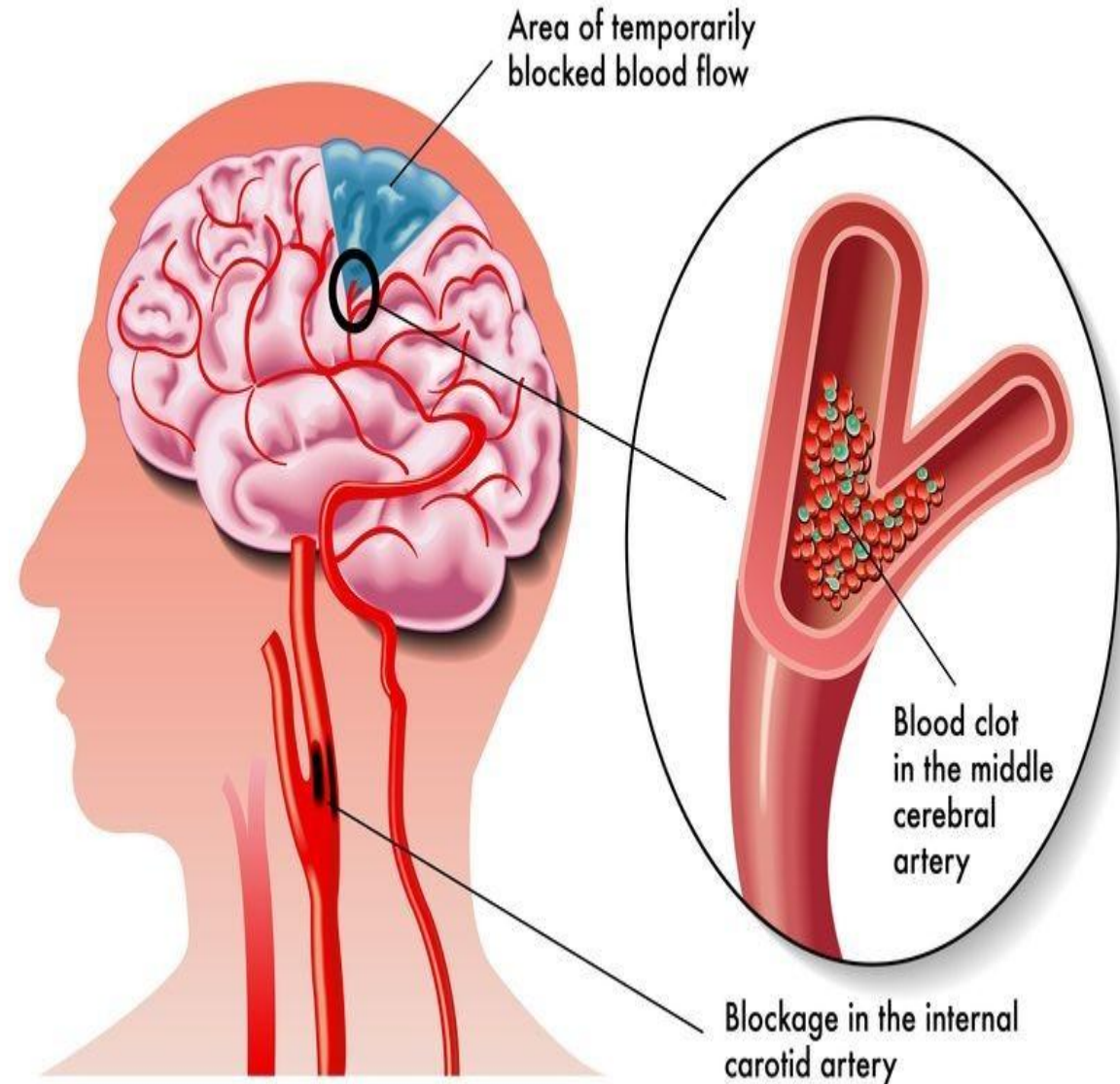
Education

Complexity of vocabulary

physical and mental activity, positive attitude

Vascular Neurocognitive Disorder

- Caused by blockage or damage to blood vessels
- Second leading cause of neurocognitive disorder after Alzheimer's disease
- Onset is often sudden (e.g., stroke)
- Patterns of impairment are variable
- The symptoms relate to the area of the brain damaged.
- Most require formal care in later stages



Vascular Neurocognitive Disorder: Features

- Features
 - Cognitive disturbances – identical to dementia
 - Obvious neurological signs of brain tissue damage
 - Prevalence 1.5% in people 70 to 75 and 15% for people over 80
 - Risk slightly higher in men

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Prevention of Neurocognitive Disorders

- Reducing risk in older adults
 - Use of anti-inflammatory medications
 - Control blood pressure, don't smoke, and lead active social life
- Other targets of prevention efforts
 - Increasing safety behaviors to reduce head trauma
 - Reducing exposure to neurotoxins and use of drugs

Neurocognitive Disorder Due to Lewy Body Disease

- Lewy bodies = microscopic protein deposits that damage brain over time
- Symptoms onset gradually
- Symptoms include impaired attention and alertness, visual hallucinations, motor impairment



Neurocognitive Disorder Due to Parkinson's Disease

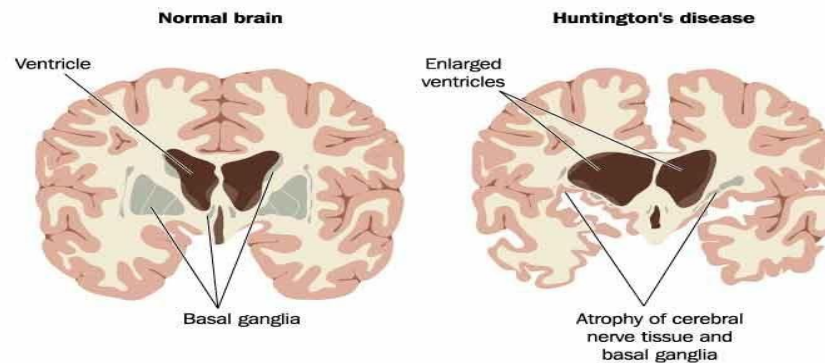
- Parkinson's disease

- Degenerative brain disorder
- Dopamine pathway damage
- 1 out of 1000 people are affected worldwide
- Chief difficulty: motor problems
 - Tremors, posture, walking, speech
- Not all with PD will develop dementia
- 75% survive 10+ years after diagnosis



Neurocognitive Disorder Due to Huntington's Disease

- Huntington's Disease = genetic autosomal dominant disorder
 - Caused by a gene on chromosome 4
- Manifests initially as involuntary limb movements (chorea), usually later in life
- Somewhere between 20% to 80% display neurocognitive disorder
- Dementia follows a subcortical pattern



Neurocognitive Disorder Due to Prion Disease

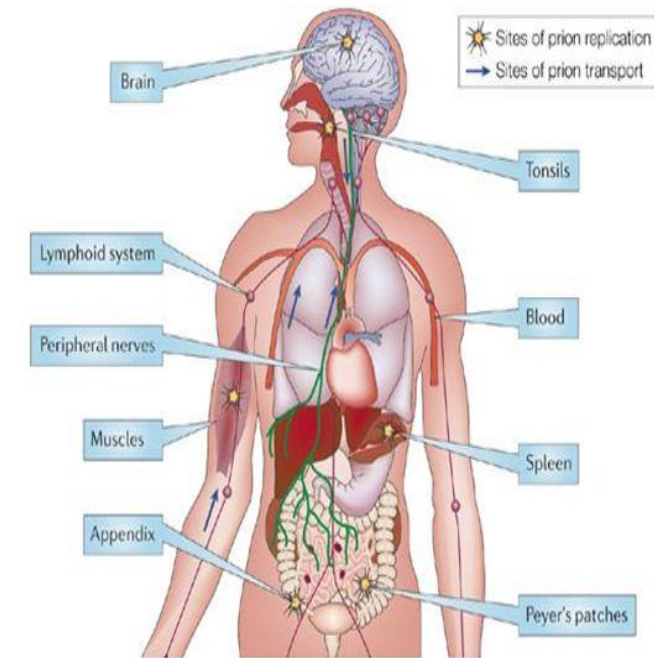
Prions

- Disorder of proteins in the brain that reproduce and cause damage
- No known treatment, always fatal
- Can only be acquired through cannibalism or accidental transmission (e.g., contaminated blood transfusion)
- Example: Creutzfeldt-Jakob disease
 - Affects one out of 1,000,000 persons
 - Linked to mad cow disease

- slow-acting, virtually indestructible infectious **proteins** that cause **brain diseases in mammals**

– Prions spread by converting normal proteins into the prion version

- a transmissible protein
- Ex: “mad cow disease”



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Summary of Neurocognitive Disorders

- Cognitive disorders span a range of deficits
 - Affect attention, memory, language, and motor behavior
 - Causes include
 - Aging
 - Medical conditions
 - Abnormal brain structures
 - Drug use
 - Environmental factors

Summary of Neurocognitive Disorders

- Cognitive disorders span a range of deficits
 - Affect attention, memory, language, and motor behavior
 - Causes include
 - Aging
 - Medical conditions
 - Abnormal brain structures
 - Drug use
 - Environmental factors
- Most result in progressive deterioration of functioning
- Few treatments exist to reverse damage and deficits, but progression may be slowed