Dementia

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What is “Dementia”?

Dementia is a *general term* referring to a decline in cognitive/mental functioning; this decline can be manifest as a difficulty in

- ***memory**
- ***thinking and reasoning**
- ***language**
- ***judgment**
- ***personality**
- ***other “higher-order” functions**

Diagnosis and Classification of Dementias

- **Generally a person is not diagnosed with dementia unless they show difficulties in at least 2 domains *and* the impairment interferes with daily activities**
- **Dementias can be classified by many different characteristics into "classes"; positive diagnosis within a class of dementias can be done (generally) only on autopsy**
- **Thus, a *specific type* of dementia is generally diagnosed during life as "definite, probable, possible"**

Classification of Dementias

- **Dementias can be**
  - **Primary, meaning that the dementia is the *primary* condition; Alzheimer's disease would be considered a primary dementia**
  - **Secondary, meaning that the dementia is the result of some other disorder or condition; Parkinson's Disease Dementia would be considered a secondary dementia**

Dementias (Secondary)

- **Secondary dementias include:**
  - **Parkinson's Disease Dementia**
  - **Huntington's Disease Dementia**
  - **Wernicke-Korsakoff's Dementia**
  - **Normal Pressure Hydrocephalus Dementia***
  - **Drug-induced Dementia***

Potentially reversible

Dementias (Primary)

- Alzheimer's Disease
- Vascular Dementia
- Lewy-Body Dementia
- Frontotemporal Dementia
- Other rare dementias

Primary dementias are chronic, progressive, and irreversible

Alzheimer's Disease

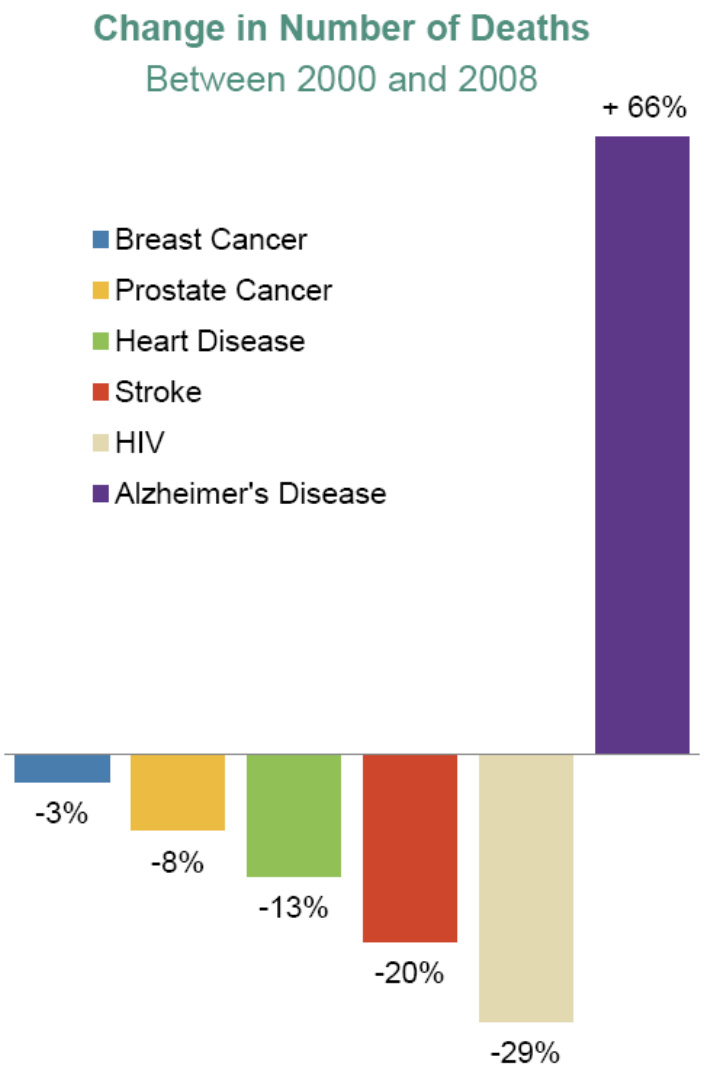
- Is a primary dementia; except for genetic forms, cause unknown

- Is the most *common* type of primary dementia

- Is a fatal neurodegenerative disease affecting ~5 million Americans and ~25 million individuals globally, primarily in industrialized nations

- Early-onset form (<65) – familial - ~5% of cases; autosomal dominant

- Late-onset form (>65) – 95% of cases; sporadic



Epidemiology
(U.S.; Late-onset Alzheimer's)

- **By Sex: Women > Men**

- **By Ethnicity:**
  - **African-Americans**
  - **American Indians/Native Alaskans**
  - **Latinos/Pacific Islanders**
  - **Caucasians**
  - **Asian-Americans**

- **By Age: 1/9 >65; 1/3 >85**

BEHAVIORAL CHANGES IN ALZHEIMER'S DISEASE

- MEMORY LOSS
- DECREASED INITIATIVE
- DEPRESSION; EMOTIONAL INSTABILITY
- INABILITY TO INHIBIT BEHAVIOR
- FAULTY JUDGMENT, LOSS OF INSIGHT
- SEVERE LANGUAGE DEFICITS
- LOSS OF "SELF" and ABILITY TO "ENGAGE" INTERNALLY

Major brain areas affected in Alzheimer's Disease

Cortical/Subcortical

- **Neo-cortex** – higher-order cortical areas necessary for normal social and cognitive functioning

- **Medial cortex/cingulate gyrus** – default mode network – internal dialogue

- **Hippocampus** – an old cortical area critically involved in learning and memory and in the formation of an "autobiography"

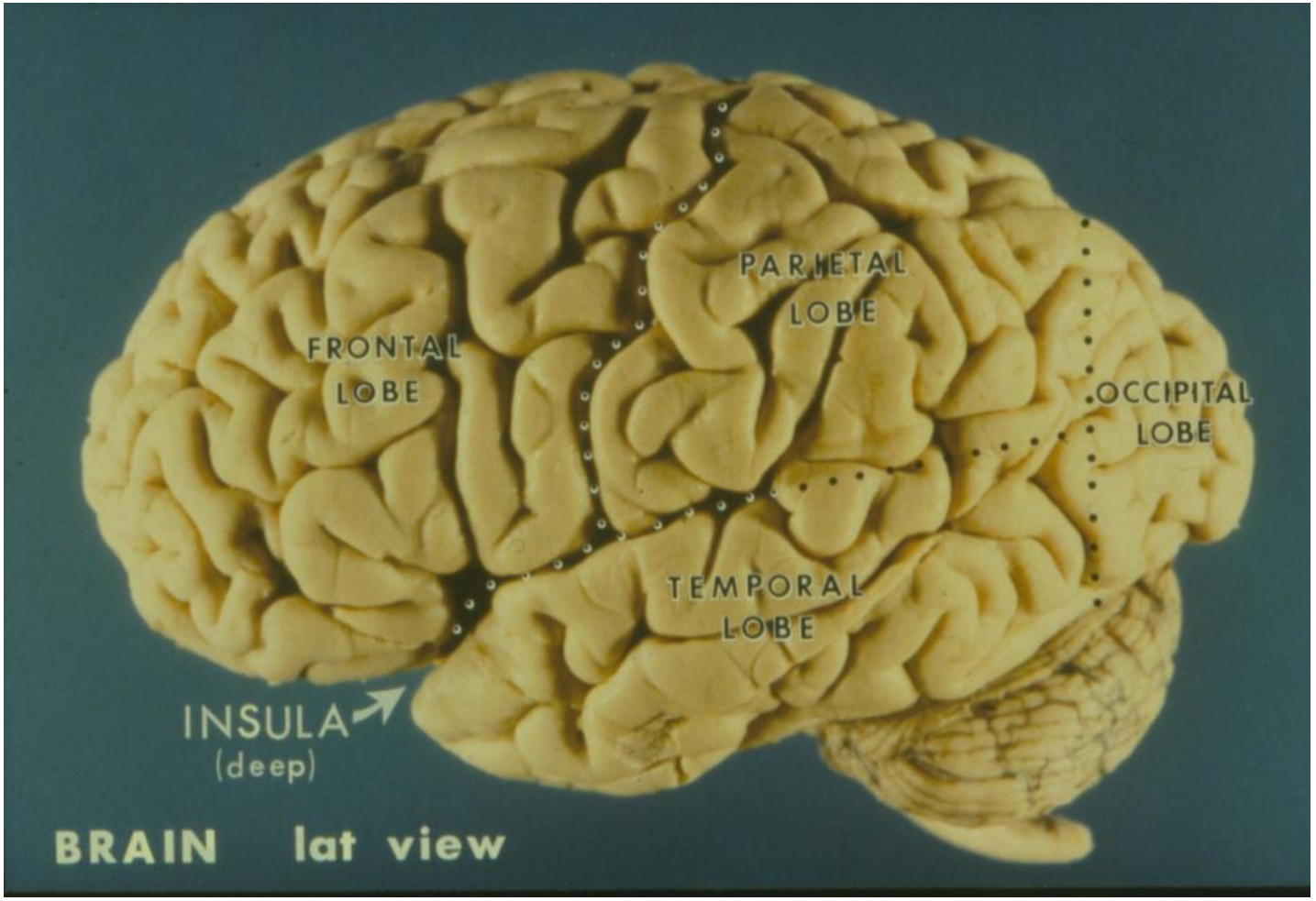
- **Amygdala** – a subcortical area in involved in emotional behavior/memory, especially "fear"

Major Brain Areas affected in Alzheimer's Disease

Brainstem

- **Locus coeruleus (norepinephrine) – attention & arousal**
- **Raphe nuclei (serotonin) – mood regulation**
- **Nucleus basalis of Meynert (acetylcholine) – function unknown; degeneration is always associated with dementia**

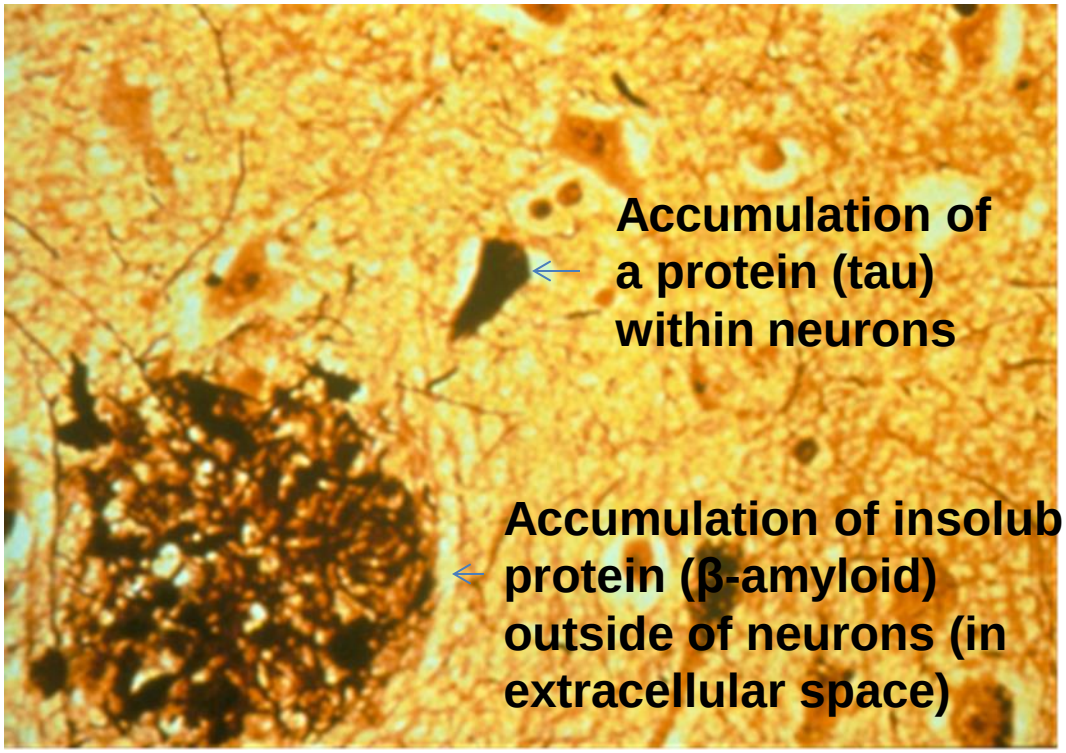
CORTEX: the outer 1-4 mm of nerve cells surrounding the hemispheres – responsible for voluntary action & thought, executive function, higher-order functions and subjective experience



Alzheimer's Disease causes death of cortical neurons, especially those involved in higher-order functions

Alzheimer's disease **Normal (age-matched)**

At Autopsy, Abnormal Cellular and Extracellular Accumulation of "Altered" Proteins can be Identified



"TANGLES"

"PLAQUES"

Other Abnormalities

- Accumulation of β-amyloid insoluble protein; soluble β-amyloid normally cleared from brain during restful sleep
- Mitochondrial abnormalities
- Changes in blood vessels and blood-brain barrier
- Abnormalities in insulin receptors (some scientists consider Alzheimer's disease to be a Type III diabetes)

Factors that Increase Risk for Late-onset Alzheimer's Disease

- **SEX, ETHNICITY, AGE**
- **INHERITANCE OF E4 ALLELES FOR ApoE**
- **HEAD INJURY**
- **OBESITY**
- **HIGH FAT DIET; ELEVATED BLOOD CHOLESTEROL**
- **ATHEROSCLEROSIS, DIABETES, HYPERTENSION**
- **HISTORY OF UNTREATED DEPRESSION**
- **HORMONE REPLACEMENT THERAPY (if started >65)**
- **CHRONIC STRESS (HIGH BLOOD CORTISOL)**
- **DIAGNOSIS OF MCI (Mild Cognitive Impairment)**
- **HEARING LOSS**

Factors that Decrease Risk for Late-onset Alzheimer's Disease

- **GOOD GENES!**
- **BEING YOUNG!**
- **HEALTHY DIET**
- **RESTFUL SLEEP**
- **CONTINUING MENTAL *CHALLENGE***
- **MAINTAINING STRONG SOCIAL CONNECTIONS**
- ****EXERCISE****

"The Nun Study"

Physical Benefits of Exercise

- ***Increases***

Endurance
Strength (muscle & bone)
Flexibility
Balance & posture
Restful sleep
Resistance to stress
Overall cardiovascular fitness
Weight control

- ***Decreases***

Hypertension
Heart disease
Type II diabetes
Osteoporosis
Falls

Cognitive Benefits of Exercise

- *Increases*
  - ❖ Generation of new neurons in hippocampus and prefrontal cortex
  - ❖ Survival of neurons (by ↑ neurotrophic factors and↑ blood supply)
  - ❖ Synaptic Plasticity
  - ❖ Restful sleep (promotes memory consolidation and ↑↑ amyloid clearance from the brain)
  - ❖ Production of Neurotransmitters/Substances that play a role in Attention, Arousal, Mood & Well-Being

- *Decreases*
  - ❖ Age-related loss of neurons in cortex
  - ❖ Death of new baby neurons in prefrontal cortex and hippocampus
  - ❖ Age-related decline in cognitive performance
  - ❖ Risk for Alzheimer's Disease

Factors that Decrease Risk for Alzheimer's Disease

- ***Not under your control***
  - **Choosing good parents ☺**
  - **Not aging (!)**

- ***Under your control***
  - **Eating a healthy diet (stay close to the earth and sea; fruits, veggies, nuts, whole grains, fish high in omega 3 oils)**
  - **Maintaining a healthy weight; controlling HBP, cholesterol, etc.**
  - **Restful sleep**
  - **Continuing mental challenge**
  - **Maintaining strong social & personal connections**
  - **PHYSICAL EXERCISE!**

Dachsie Wisdom: EXERCISE AND CHALLENGE YOURSELF mentally, emotionally and physically - One Step at a Time ♥