

### Etiology

- Cortical atrophy and loss of neurons

### Risk Factors

- **Age:** prevalence doubles for every decade after age 60
- **Family history:** genetic mutations
- **Gender:** more common in women
- **Exposures:** head trauma, high cholesterol, lack of mental stimulation

### Pathogenesis

- Neurofibrillary tangles and amyloid plaques
- Amyloid plaques form from imbalance of production and removal of amyloid beta
- Decreased cholinergic transmission
  - o Decreased acetylcholine production
- Results in the noticeable atrophy

### Manifestations

Alzheimer disease has also been described using four words that begin with A:

Amnesia Aphasias Apraxia Agnosia

- Loss of short-term memory
- Difficulty with language
- Behavioral changes
- 7 stages of progressive degenerative changes

### Complications

- Related to declining cognitive function
- Bowel and bladder incontinence
- Depression
- Falls [hip fractures @ high risk]
- Infections
- Malnutrition and dehydration [forgetting to eat & drink]

### Diagnosis

- Not definitive until after death Requires a brain biopsy or autopsy
- **Presumptive diagnosis based on:**
  - Review of symptoms with patient and family
  - Cognitive tests (MMSE, mini-cog, etc.)
  - Imaging: CT, MRI, PET
  - To rule out other pathology

### Treatment

- No definitive treatment or cure
- Medications may slow progression
- Other meds to control some symptoms (depression, sleep disturbances, agitation)

### Stages of Alzheimer Disease

#### Progression

**Preclinical:** changes in brain that do not result in noticeable signs/symptoms

**Stage 1 (mild):** detected w/ screening tool

**Stage 2 (moderate):** pronounced changes

**Stage 3 (Severe)**

#### • Preclinical

changes in brain that do not result in noticeable signs/symptoms

o can last for years

#### Stage 1 (mild)

Can be detected w/ the use of screening tools

- o Coming up with the right word or name.
- o Remembering names when introduced to new people.
- o Having difficulty performing tasks in social or work settings.
- o Forgetting material that was just read.
- o Losing or misplacing a valuable object.
- o Experiencing increased trouble with planning or organizing.
- o If identified, this is the stage where they should be placing things in order in the event it progresses fast
  - 🔗 Financial situation, POA, medical directives, living situation, etc.

### Stage 2 (moderate)

- o Being forgetful of events or personal history.
- o Feeling moody or withdrawn, especially in socially or mentally challenging situations.
- o Being unable to recall information about themselves like their address or telephone number, and the high school or college they attended.
- o Experiencing confusion about where they are or what day it is.
- o Requiring help choosing proper clothing for the season or the occasion.
- o Having trouble controlling their bladder and bowels.
- o Experiencing changes in sleep patterns, such as sleeping during the day and becoming restless at night.
- o Showing an increased tendency to wander and become lost.
- o Demonstrating personality and behavioral changes, including suspiciousness and delusions or compulsive, repetitive behavior like hand-wringing or tissue shredding.

### Stage 3 (Severe)

- o Require around-the-clock assistance with daily personal care.
- o Lose awareness of recent experiences as well as of their surroundings.
- o Experience changes in physical abilities, including walking, sitting and, eventually, swallowing
- o Have difficulty communicating.
- o Become vulnerable to infections, especially pneumonia.

### Drugs Used to Treat Alzheimer Disease

#### Cholinesterase Inhibitors

Prototype: **Donepezil**

prevent the breakdown of the neurotransmitter acetylcholine

- o Reversible cholinesterase inhibitor that causes elevated levels of acetylcholine (ACh) in the cerebral cortex which slows the neuronal degradation of Alzheimer disease
- o Not a cure it ONLY improves cognition & memory
- o Slows effects of Alzheimer's but will NOT stop the disease
- o Adverse effects: insomnia, fatigue, rash, N/V/D, dyspepsia, abdominal pain, muscle cramps

#### N-Methyl-D-aspartate (NMDA)

##### Antagonist

Prototype: **Memantine**

- o Memantine is used to treat moderate-to-severe Alzheimer's disease, especially for people who are intolerant of or have a contraindication to cholinesterase inhibitors
- o A dysfunction of glutamatergic neurotransmission, manifested as neuronal excitotoxicity, is hypothesized to be involved in the etiology of Alzheimer disease.

Adverse effects:

- o Confusion
- o Dizziness
- o Drowsiness
- o Headache
- o Insomnia
- o Agitation
- o Hallucinations
- o Less common adverse effects include vomiting, anxiety, hypertonia, cystitis, and increased libido.

antagonizes (inhibits) NMDA (glutamate) receptors

