# Alzheimer's Disease

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# Learning Objectives

- At the end of this lecture students should be able to:

- Define Alzheimers disease.
- Describe anatomical changes in the brain in Alzheimers disease.
- Discuss pathophysiology of Alzheimers disease.
- Briefly discuss the investigations and treatment of Alzheimers disease.

- DEMENTIA?

Cause?

- Set of symptoms:

i. Poor memory
ii. Difficulty in learning, remembering and imagining.

- Alzheimer's disease is a neuro-degenrative disease.
- It is an irreversible, progressive disorder in which brain cells (neurons) deteriorate, resulting in the loss of cognitive functions, primarily memory, judgment and reasoning, movement coordination and pattern recognition.

Comparison of a normal aged brain (left) and an Alzheimer's patient's brain (right). Differential characteristics are pointed out.

# CAUSE

- It is not completely understood however certain factors are thought to be implicated in this disease.

1. Neurochemical (Acetylcholine, Norepinephrin)
2. Environmental( Cigarette smoking,metals or industrial toxins)
3. Genetic

# RISK FACTORS

- Down's syndrome.
- Family History.
- Chronic high BP.
- Head injuries.
- Smoking and Drinking

- The characteristic pathology of Alzheimer's disease consists of progressive atrophy of cortical and subcortical structures. Histologically, there are neurofibrillary tangles and amyloid containing senile plaques throughout the brain.

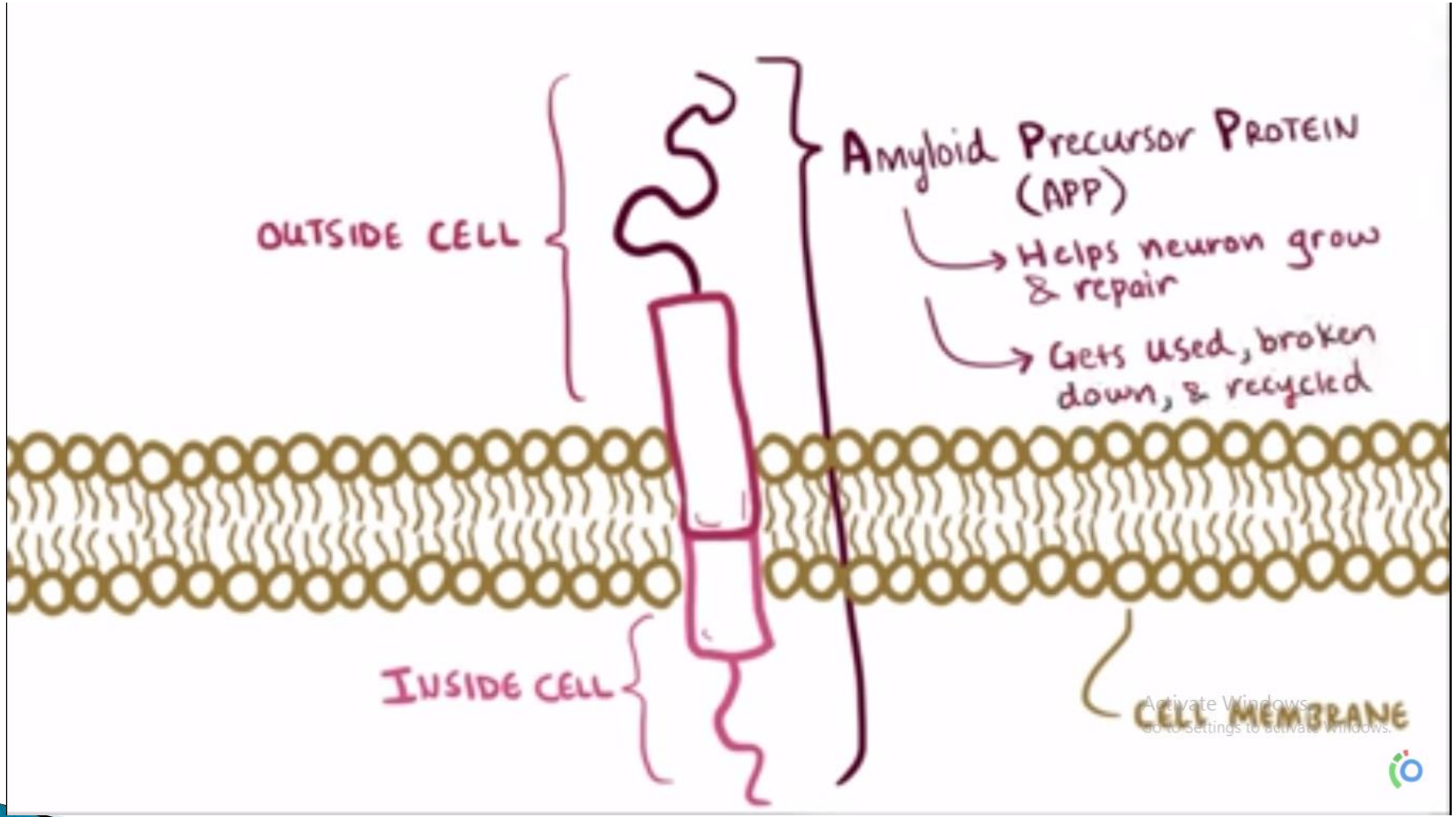
# Pathophysiology

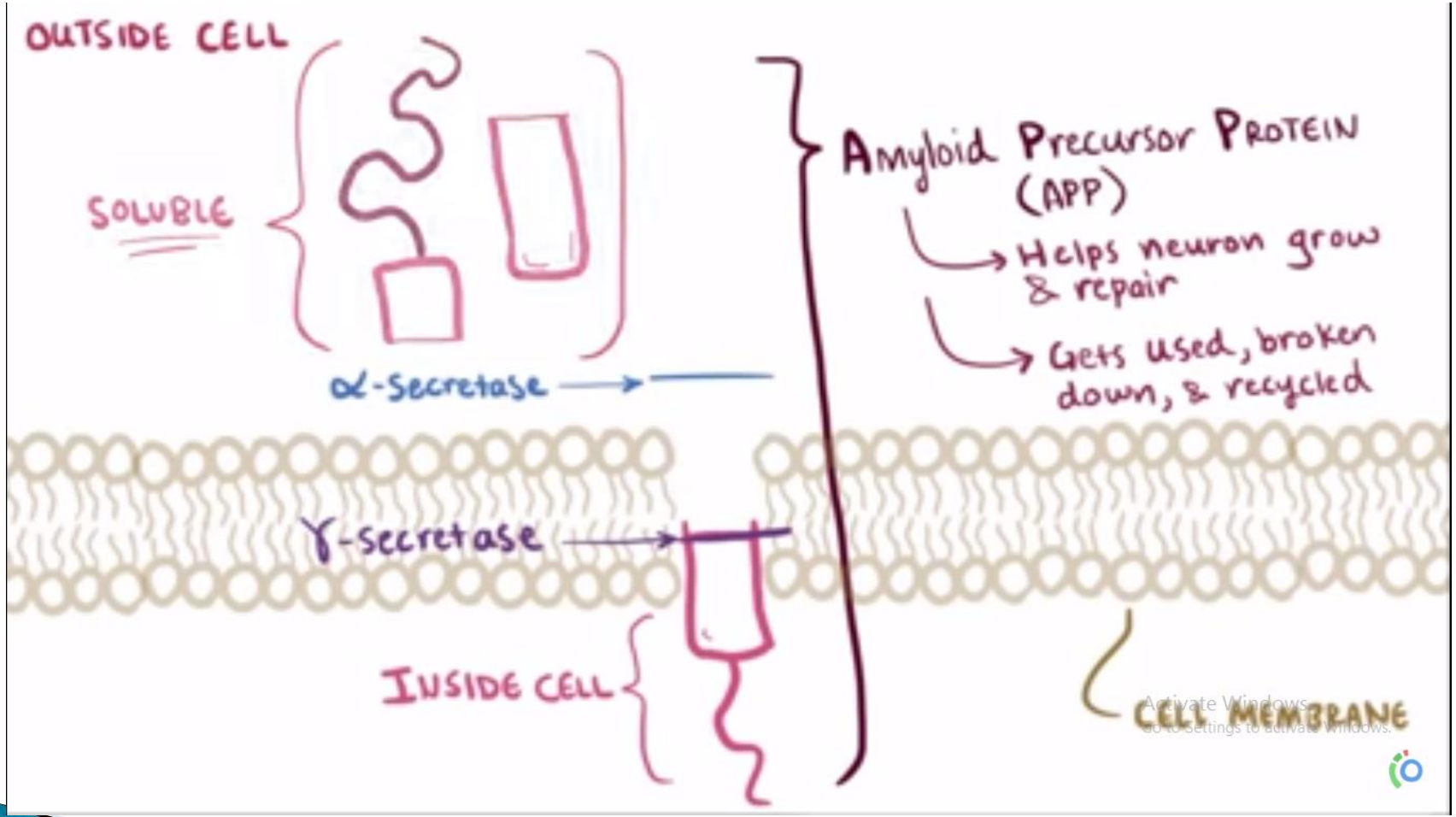
- Alzheimer's disease attacks nerves and brain cells as well as neurotransmitters.

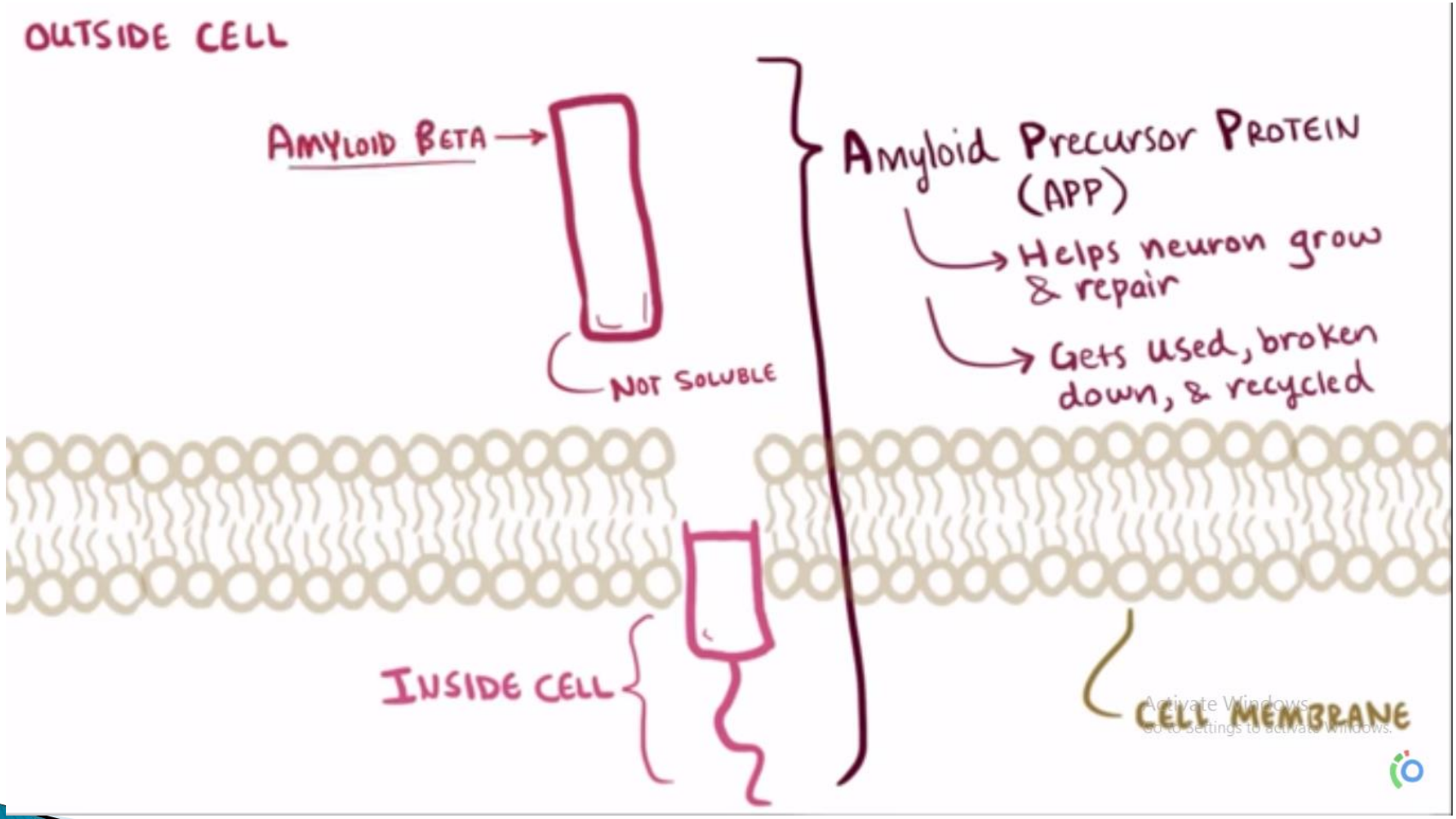
- The destruction of these parts causes clumps of protein to form around the brain's cells. These clumps are known as 'plaques' and ‘tangles'. The presence of the 'plaques' and ‘tangles' start to destroy more connections between the brain cells, which makes the condition worse.

- Amyloid plaques and neurofibrillary tangles are unique structures in the brain tissue that are suspected to be involved in the pathophysiology of Alzheimer's disease.

- Amyloid plaques are clusters that form in the spaces between the nerve cells.


OUTSIDE CELL
Amyloid Precursor Protein (APP)
Helps neuron grow & repair
Gets used, broken down, & recycled
INSIDE CELL
CELL MEMBRANE

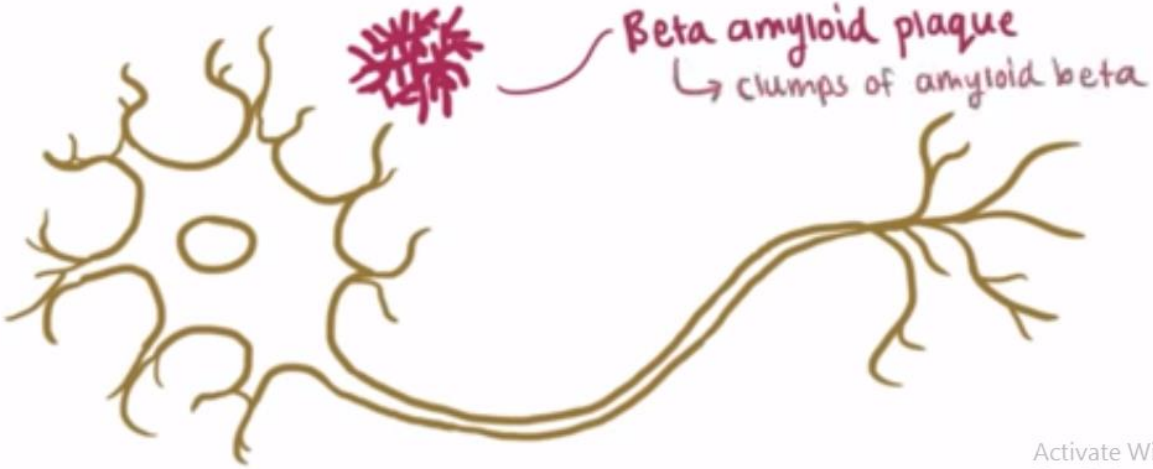

OUTSIDE CELL
SOLUBLE
α-Secretase
γ-Secretase
INSIDE CELL
Amyloid Precursor Protein (APP)
Helps neuron grow & repair
Gets used, broken down, & recycled
CELL MEMBRANE


OUTSIDE CELL
AMYLOID BETA
NOT SOLUBLE
Amyloid Precursor Protein (APP)
Helps neuron grow & repair
Gets used, broken down, & recycled
INSIDE CELL
CELL MEMBRANE

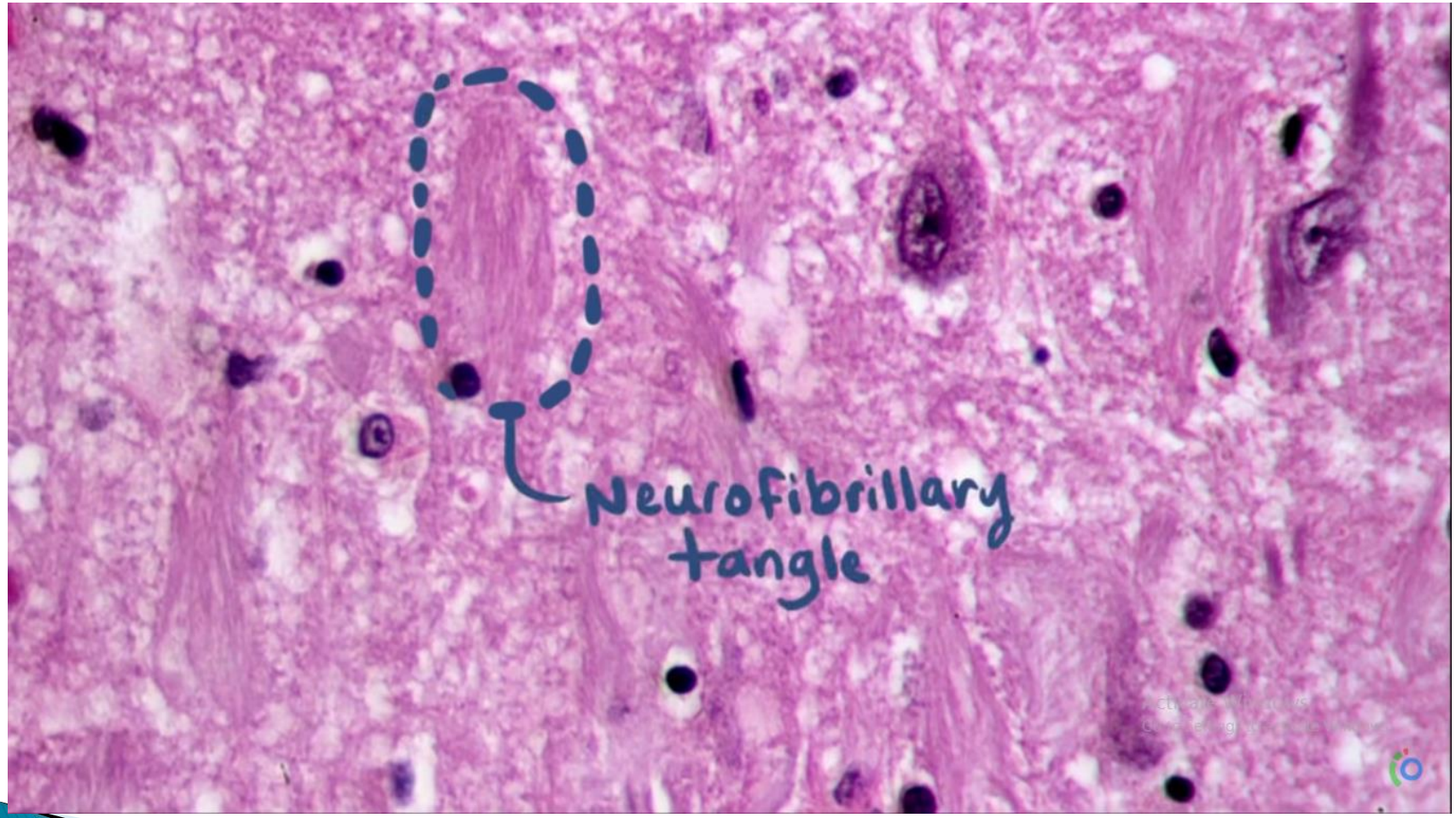
# ALZHEIMER DISEASE

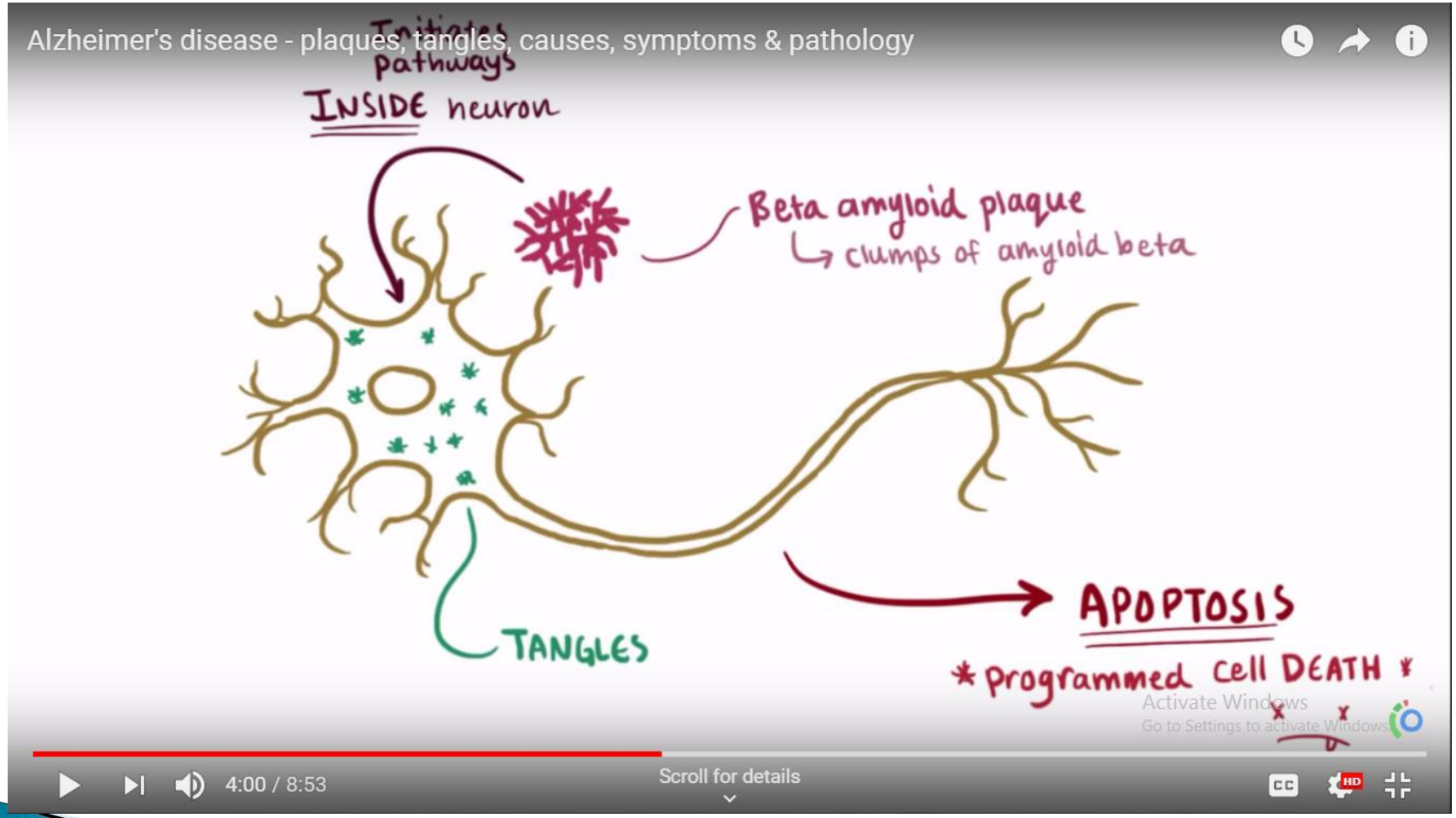
* most common cause of DEMENTIA *

- PLAQUES
- TANGLES



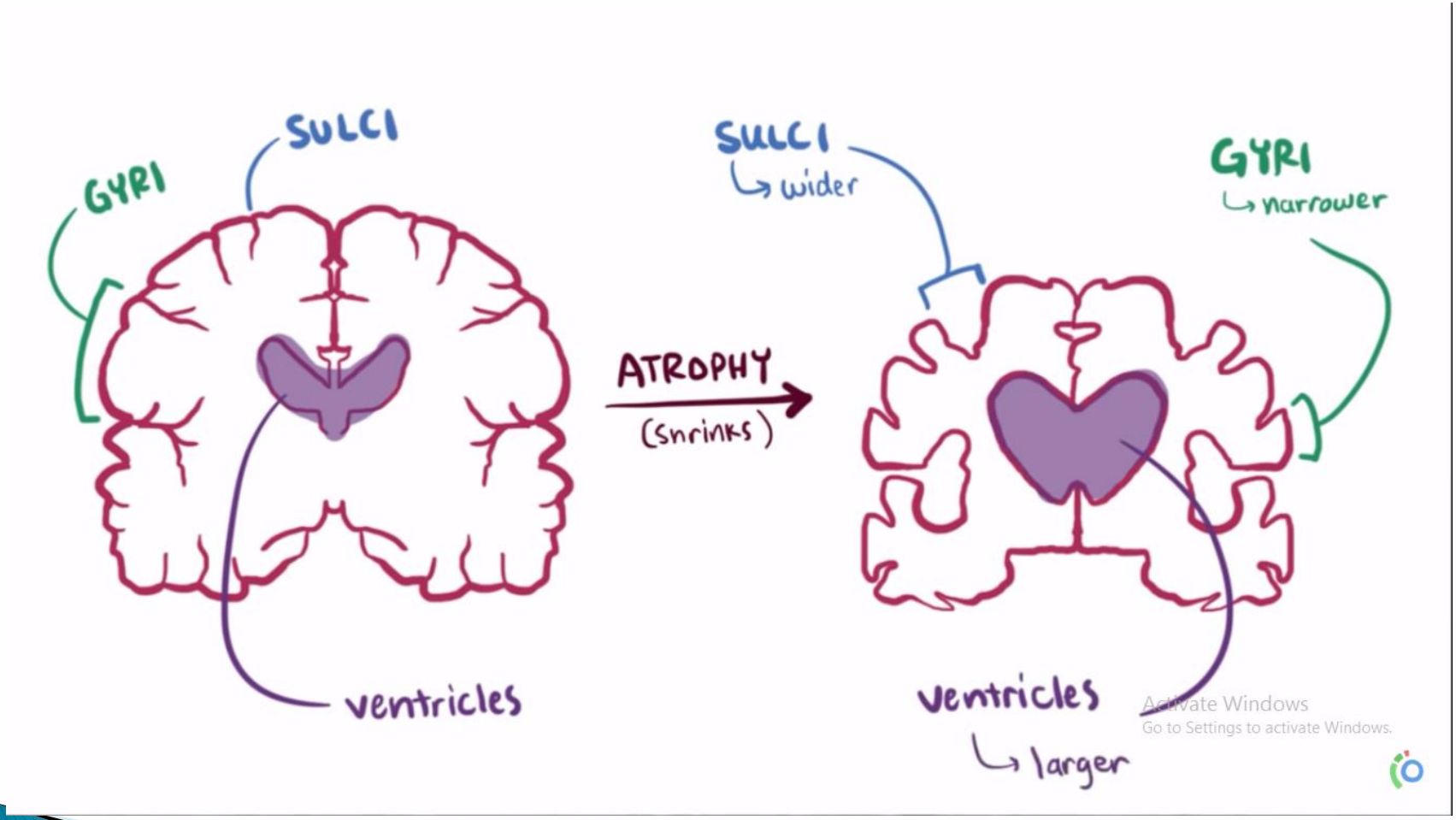
- Neurofibrillary tangles (NFTs) are twisted remnants of a protein called tau, which is found inside brain cells and is essential for maintaining proper cell structure and function. An abnormality in the tau protein disrupts normal cell activity.

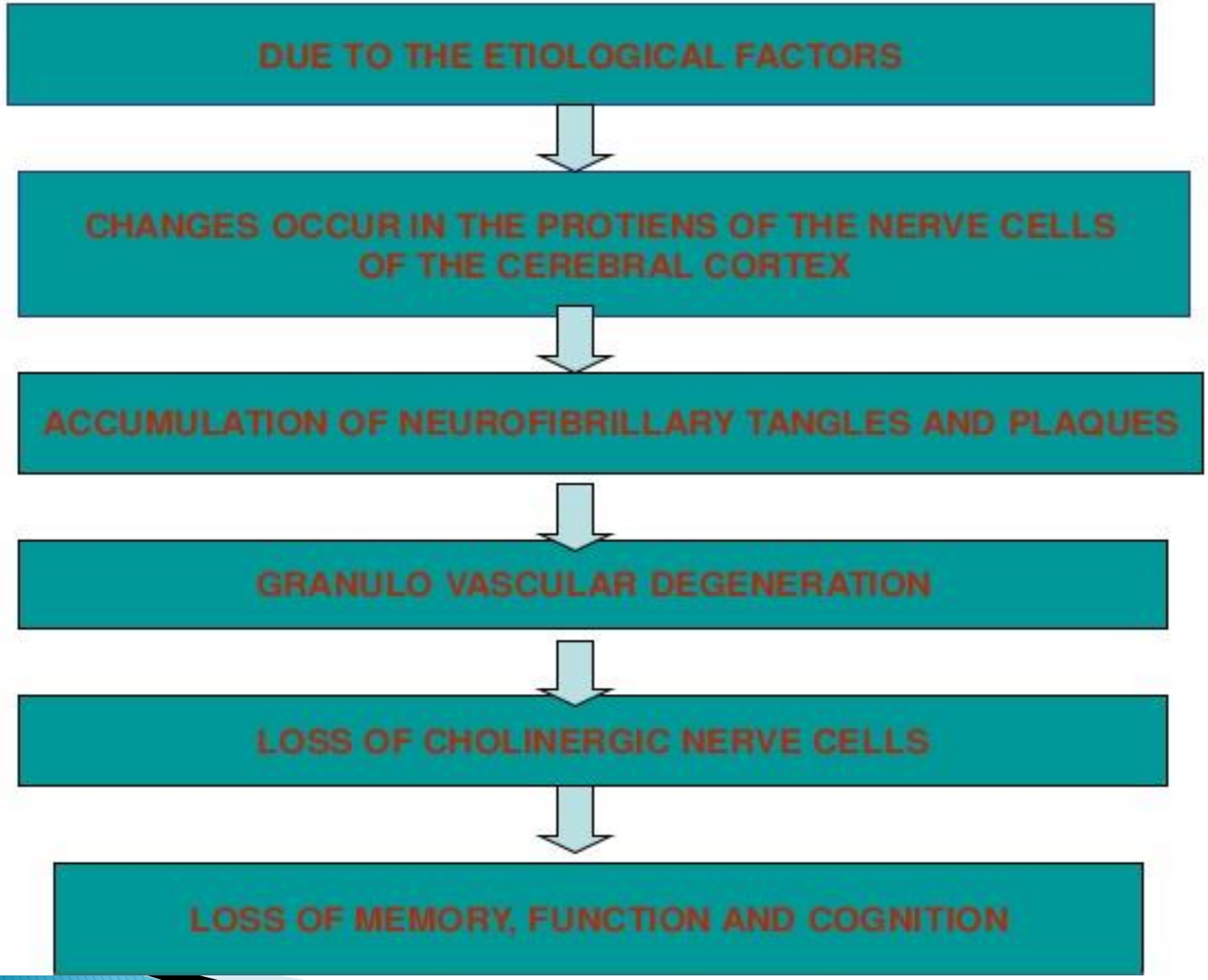

Neurofibrillary
tangle


Alzheimer's disease - plaques, tangles, causes, symptoms & pathology
Initiates pathways
INSIDE neuron
Beta amyloid plaque
↳ clumps of amyloid beta
TANGLES
APOPTOSIS
* programmed cell DEATH
Activate Windows
Go to Settings to activate Windows.
4:00 / 8:53
Scroll for details

# Morphological features

- The Gyri narrows
- The sulci widens
- The ventricals dilate




DUE TO THE ETIOLOGICAL FACTORS
CHANGES OCCUR IN THE PROTIENS OF THE NERVE CELLS OF THE CEREBRAL CORTEX
ACCUMULATION OF NEUROFIBRILLARY TANGLES AND PLAQUES
GRANULO VASCULAR DEGENERATION
LOSS OF CHOLINERGIC NERVE CELLS
LOSS OF MEMORY, FUNCTION AND COGNITION

# Symptoms

- Confusion
- Disturbances in short-term and long term memory
- Problems with attention and spatial orientation
- Personality changes
- Language difficulties
- Unexplained mood swings
- Loss of motor skills

# DIAGNOSIS

- Difficult
- Definitive way is brain biopsy after autopsy.

# Treatment

- Currently there is no cure, medications have small benefit.

- THANKYOU!!!