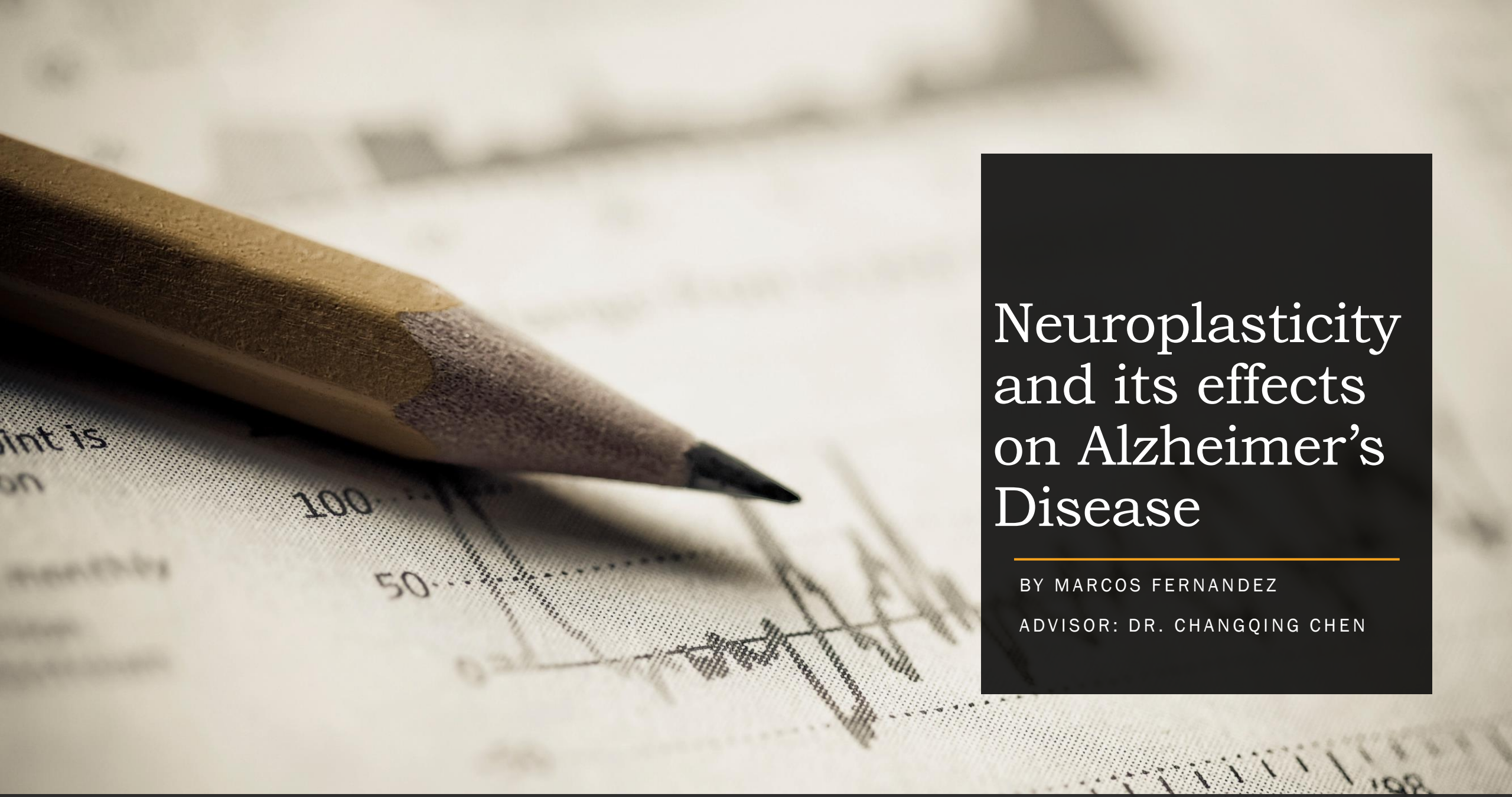

Neuroplasticity and its effects on Alzheimer's Disease

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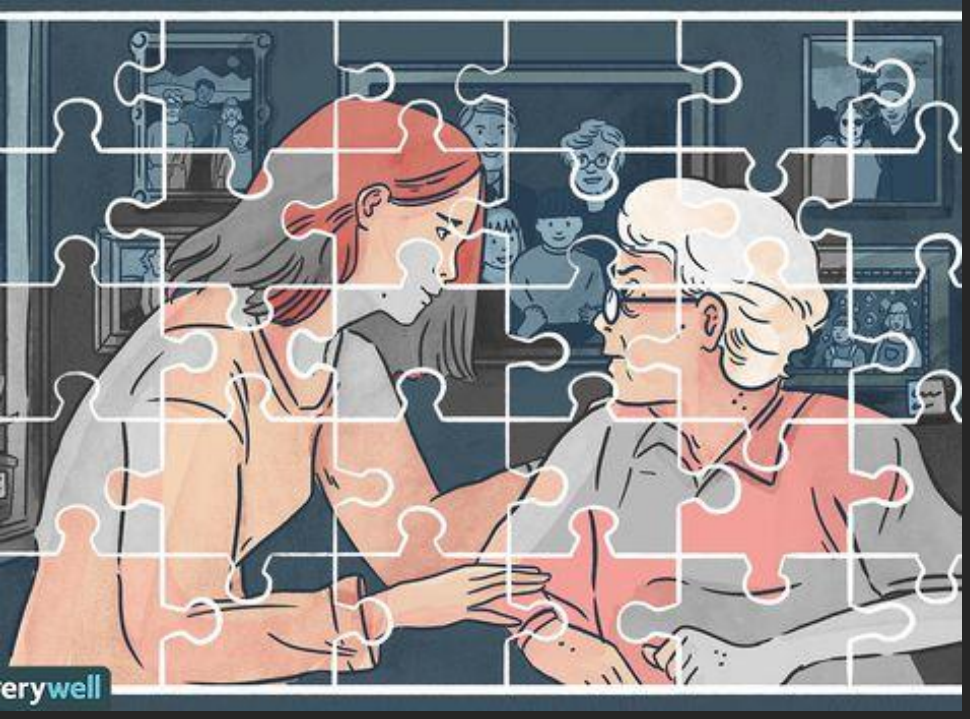
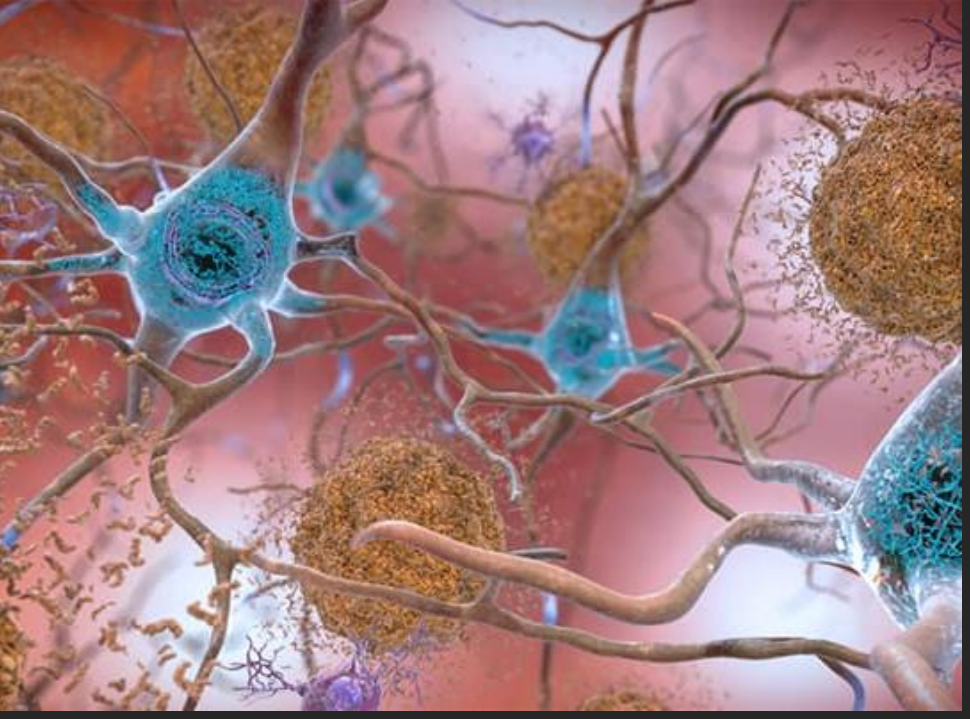
Outline

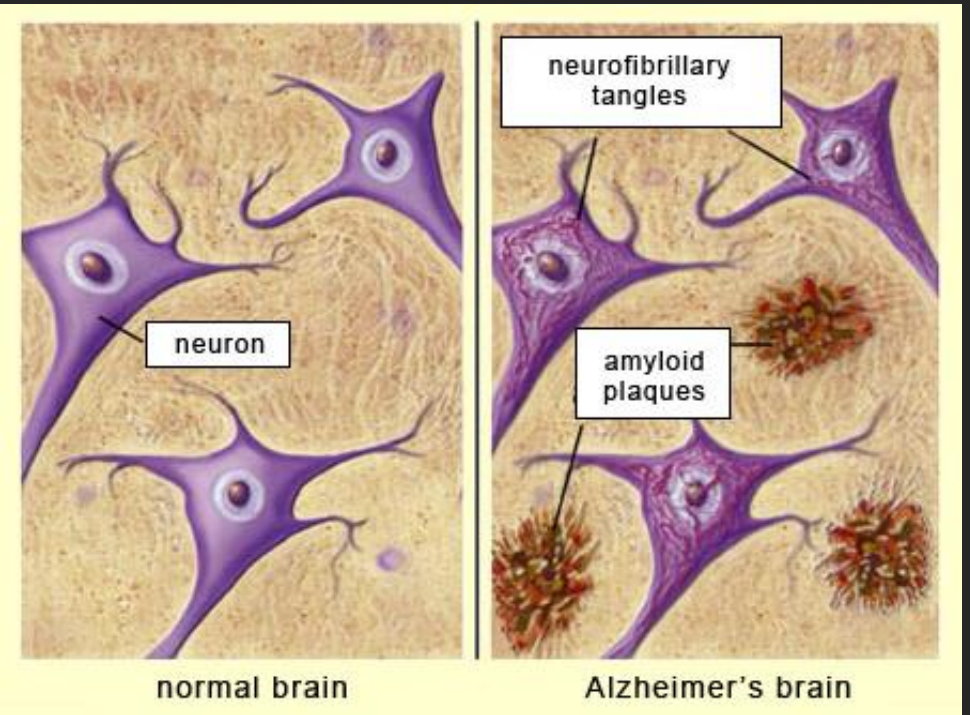
- Alzheimer’s Disease and how people are affected
- The fundamentals of Alzheimer’s Disease
- Neuroplasticity
- Functional plasticity
- The Nuns study
- Results
- Strengthening neuroplasticity
- What we should and shouldn't be doing



Alzheimer’s Disease

- Alzheimer’s Disease (AD) is a condition in which the brain is affected in more ways than one. It impacts memory loss, disorientation and the deterioration of intellectual functions. Eventually, even motor skills can be lost to this condition.
- AD causes degeneration of the cells in the brain, main cause of dementia.
- “More than 6 million Americans are living with Alzheimer's. By 2050, this number is projected to rise to nearly 13 million. 1 in 3 seniors dies with Alzheimer's or another dementia. It also kills more than breast cancer and prostate cancer combined” (Alzheimer's Association)
- The brain of a patient with Alzheimer’s consists of plaques and tau tangles. These negatively affect the communication between synapses by blocking off the transportation system of neurons.





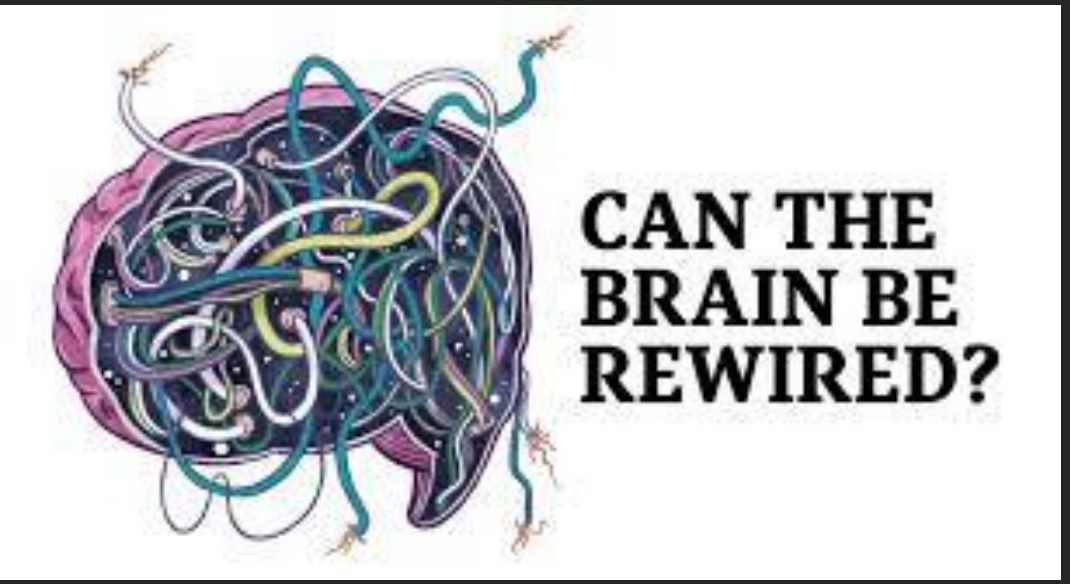
Tau Tangles & Amyloid Plaques

- It all begins with the abnormal processing of the transmembrane Aβ precursor protein.
- In the brain a protein known as Amyloid Precursor Protein (APP) is present, APP can be properly broken down and dissolved.
- The protein it cuts out of the cell membrane miss-folds and starts sticking to more misfolded proteins
- Large amounts of Aβ (beta-amyloid) affects the **Microglia cells.**
- Microglia is the cell that gets rid of plaque.
- As microglia cells fail to get rid of the excess amount of Aβ, inflammation occurs (releasing a large amount of chemicals).
- Tau is a protein used to support microtubules that is also responsible for AD. As the outer neuron is affected by Aβ, the inside of the neuron is affected by Tau.
- which force the inside of the neuron to misfold; causing inter cellular tangles that kill the neuron from inside.

➢ Let's talk about ways to protect your cognitive ability from suffering this fate

Neuroplasticity

- Neuroplasticity is known as brain plasticity. Is an ability This allows the brain to rewire itself and form new functions that differ from the previous functions.
- “Modification of synapses can occur on a timescale of milliseconds, synapses and dendrite branches are created or destroyed in the space of several hours, and new cells may be born or killed over periods of days.” (Moheb Costandi)
- Other forms of neuroplasticity occur over even longer time frames – gradual changes that occur in weeks, months, or years.



Functional plasticity

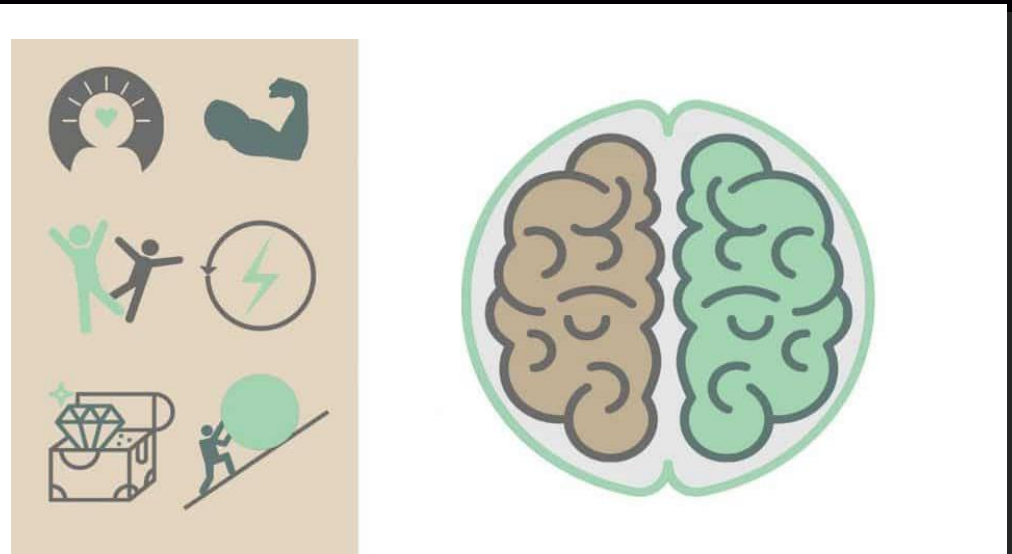
- Functional plasticity is the brain's ability to move functions from a damaged area of the brain after trauma, to other undamaged areas. Existing neural pathways that are inactive or used for other purposes take over and carry out functions lost because of the injury.
- After brain injury such as accidents or stroke, the unaffected brain areas can adapt and take over the functions of the affected parts. This process varies in speed, but it can be fast in the first few weeks (phase of spontaneous recovery) then it becomes slower.
- It can be helped by rehabilitation, and the nature of rehabilitation programs varies with the type of injury from retraining some types of movement to speech therapy.
- There are ways through which brain plasticity can enable brain-damaged people to regain some of their past capacities. Each of the approaches through which the nervous system adapts its functionality has differences in terms of how it occurs, as well as in which patients it occurs.

The Nuns study

- Because the lifestyle and strict routine of a nun, neuroplasticity affects the nuns in small portions.
- David Snowdon chose a small group of nuns as subjects for a **study on aging and brain deterioration**. The study include nearly **700 sisters** across the United States; the study reveals **insights** into the **aging process** and **Alzheimer's disease**.
- Goal: **Why the brain deteriorated with age in some people and not others**.
- The nuns **ranged from ages 75-103** included a wide range of health, nuns that were **healthy and some disabled**.
- **Nuns share so many environmental variables**, leading similar lifestyles free from excessive alcohol consumption and smoking and even working in similar environments.

Method/Results

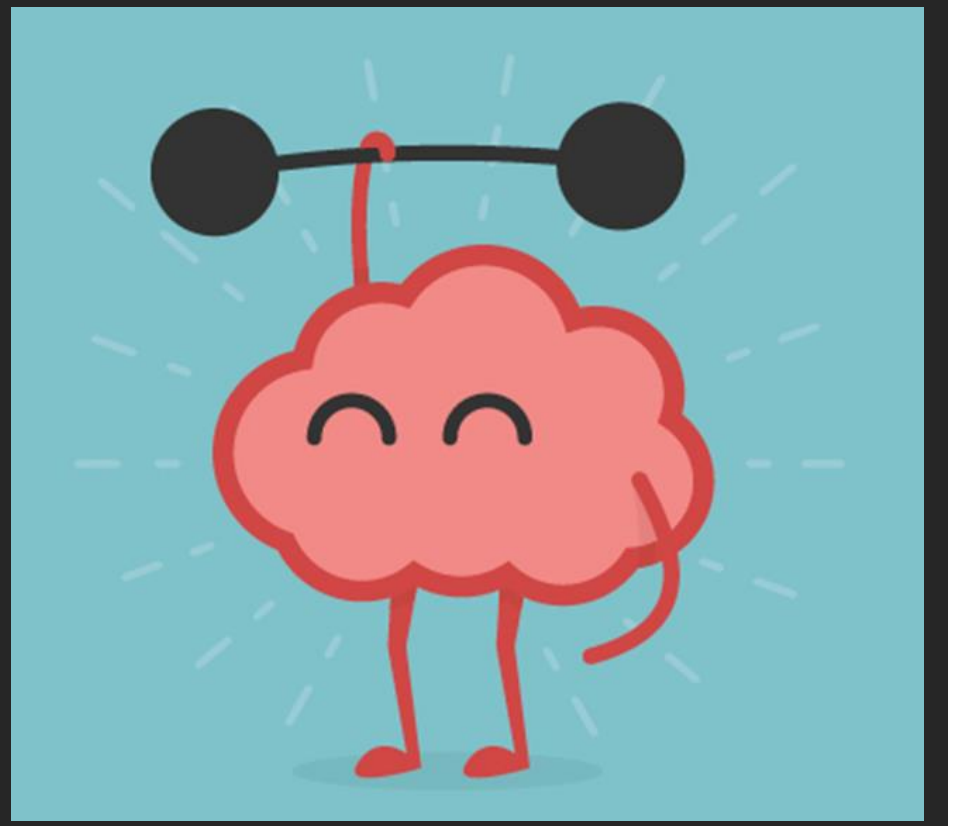
- The sisters agreed to participate in annual bloodwork, cognitive assessments, ~~medical exams, and physical assessments that happened throughout the~~ study.
- Prior to taking their vows, Nuns wrote an autobiographical statement, in which their linguistic ability was shown.
- Past research indicated that having both oral and written linguistic ability is a good indication of cognitive ability. Having high levels of linguistic ability earlier in life may protect against cognitive decline in old age.
- The autobiographies gathered 60 years after they were written, then asked the nuns between the ages of 75 and 90 years old to participate in a cognitive assessment.
- The sisters who demonstrated a low level of linguistic ability in their autobiography statements had lower cognitive test scores later in life.
- This means that the brain begins showing signs of deterioration at a very early age from 50 to 60 years old before symptoms develop.
- This study continues to show fascinating results giving researchers insights into the aging process.



Strengthen Neuroplasticity

- The practice of meditation is associated with neuroplasticity phenomena, reducing age-related brain degeneration and improving cognitive functions.
- Neuroimaging studies have shown that the correspondence of the brain fluctuates as meditating is taking place. Consistent meditating can promote the thickening of the pre-frontal cortex, which can increase brain function and alertness.

Strengthen Neuroplasticity



- Studies on brain plasticity have demonstrated that many aspects of your brain power, intelligence, or control can be improved by intense and appropriately targeted behavioral training.
- Activities that lead to positive brain plasticity:
- Learning a new language, learning how to play an instrument, visiting a different part of the city, state or country, going to a museum or concert, cooking new foods or listening to different music, practicing mindfulness
- Try brain aerobics: Using your alternate hand to brush your teeth or write, dressing while keeping your eyes closed, buying groceries at a different store, among others.

Summary

What we learned about :

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- Neuroplasticity
- Functional plasticity
- The Nuns study
- Results
- Strengthening neuroplasticity
- What we should and shouldn't be doing

Acknowledgments

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Citation

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