

## COGNITIVE CHANGES TO OUR BRAIN AS WE AGE

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### **Abstract:**

*As people age, they change in a myriad of ways both biological and psychological. Some of these changes may be for the better, and others are not. There is simple evidence that alterations in brain structure and functions are intimately tied to alterations in cognitive functions. Aging is associated with cognitive decline, which affects memory, language, executive functions, and the speed of information processing. Age-related cognitive impairment is generally considered to be an organic process, linked to neurodegeneration.*

**Keywords:** Cognitive aging, cognitive decline, cognitive stimulation therapy.

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## **Aging:**

The process of growing old, especially by failure of replacement of cells in sufficient numbers to maintain full functional capacity, particularly affects cells incapable of mitotic division.

## **Cognitive Decline:**

Cognitive decline is deterioration in cognitive function, characterized by increasing difficulties with memory, speed of information processing, language and other cognitive functions due to the process of aging.

## **Cognitive Aging:**

Cognitive aging refers to a pattern of age-related changes of cognitive functioning.

## **Types of Cognitive disorders among the elderly:**

### **1. Age-associated memory impairment (AAMI):**

Over the age of 50, mild memory changes may occur while other cognitive functions remain intact.

### **2. Age-associated cognitive decline (AACD):**

Cognitive problems include the memory difficulties and are also extended to such cognitive domains as language, visuo-spatial ability and executive function.

### **3. Mild Cognitive Impairment (MCI):**

There is a slight impairment in the cognitive function, typically memory, that is the state between the cognition in normal aging and mild dementia.

### **4. Dementia:**

Dementia is a syndrome of acquired persistent dysfunction in two or more cognitive domains that can include memory, language, visuo-spatial ability and executive functions. It affects nearly 5% of the population over the age of 65.

## **Signs and Symptoms of Cognitive Decline:**

- Forgetfulness
- Word finding difficulty ('tip-of-the-tongue' phenomenon)
- Slowed reaction time
- Difficulty in learning new tasks
- Decreased ability to maintain focus

- Decreased problem solving ability.

## **What causes cognitive decline:**

### **I. Biological risk factors:**

#### **1. Oxidative Stress:**

The brain is susceptible to oxidative damage since it consumes 20% of the oxygen used by the body, and because it contains high concentrations of phospholipids which are prone to oxidative damage. As we age, there is a significant and progressive increase in the level of oxidatively damaged DNA & lipids in the brain. Over time, this free radical damage leads to the death of neurons.

#### **2. Chronic Inflammation:**

The inflammatory process in the brain is unique in that the blood brain barrier (BBB) prevents the infiltration of inflammatory agents. However, chronic systemic inflammation induced by stimuli, compromises the integrity of BBB, allowing the irritants to enter the brain and stimulate the production of inflammatory cytokines. In the CNS, these cytokines impair Neurogenesis.

#### **3. Hormonal Imbalance:**

The steroid hormone receptors are distributed throughout the brain, which function to regulate the transcription of a vast array of genes involved in cognition and behavior. When hormonal disturbances or deficiencies disrupt reception activation, cognitive deficits and emotional turmoil are the result.

#### **4. Diabetes and Insulin resistance:**

Due to the high metabolic demand for energy in the brain, even small perturbations in glucose metabolism can nautically impact cognitive performance. Hyperglycemia has been linked with lower levels of neuronal growth factors and higher incidence of all types of dementia.

#### **5. Obesity:**

As body might increases, brain volume drops and cognitive function worsens.

### **II. Psychological Risk Factors:**

#### **1. Anxiety and Stress:**

High anxiety levels may exert greater effort to maintain the cognitive function. So people turn to cognitive impairment earlier.

Excessive stress deteriorates the brain function and limits the attention and visuo-spatial memory as we get age.

## **2. Depression:**

Depression seems to worsen cognitive function, but poor cognitive health predisposes aging individuals to depression as well, there is a strong inter-relationship between depression and cognitive dysfunction.

## **3. Social Network and Personal Relationship:**

Social disengagement or very few or no social relationship is a strong risk factor for cognitive decline.

### **CAN ANYTHING BE DONE TO SLOW DOWN AGE RELATED CHANGES:**

Certain changes occur in the brains of the elderly. There are some interventions that can sharpen the cognitive process. These include,

#### **1. Eat a Well-balanced Diet:**

Food provides the energy and nutrition not only for body but for brain as well. Poor nutrition makes it difficult for the brain to operate properly. Proper nutrition needs:

- Certain fruits and vegetables rich in vitamins
- Anti-oxidants and minerals
- Protein-rich foods containing B vitamins
- Omega -3 fatty acids

These foods are associated with better cognitive performance.

#### **2. Stay Physically fit:**

It is not true that people should 'rest' when they get older. Try to maintain some form of daily exercise to keep your body toned and increase the amount of oxygen reaching the brain.

#### **3. Use your brain:**

Cognitive stimulation benefits the brain by enhancing cerebral blood flow. The novel cognitive stimulation encourages the brain to establish new neural networks through Synaptogenesis, which can then be used to bypass breakdowns in other neural networks arising from age related or pathological deterioration in brain circuitry.

Cognitive stimulation therapy aims to create an environment where people have fun, learn and where they strengthen their abilities and relationship among the group members, thus maintaining their social and cognitive skills at their optimum ability.

### **Conclusion:**

The brain may lose neuron cells and connections as we age. Hence, the aging brain goes through predictable changes and as a result, old age is usually accompanied by some cognitive decline. Thus,

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participating in mentally stimulating activities promotes cognitive health and reduces the risk of developing cognitive decline.

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