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Knowing cholesterol effects on alzheimer's disease

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EDITORIAL

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Alzheimer's disease is the most common form of dementia. As we know, dementia is a syndrome characterized by a number of brain function disorders such as loss of memory function, disorientation, decreased comprehensive, inability to do calculation, inability to learn, loss of language and evaluation skills, and other manifestations. Alzheimer is a progressive dementia characterized by progressive deterioration of memory, and pathologically by histopathological changes including extracellular deposits of amyloid-β (Aβ) peptides forming senile plaques (SP) and the intracellular neurofibrillary tangles (NFT) of hyperphosphorylated tau in the brain, which are commonly regarded as the hallmarks of the disease.[1] Alzheimer's disease does not only destroy nervous system but also causes mortality. The report said mortality of Alzheimer occurs nine years after Alzheimer's diagnosis. There is no drugs that appear promising to prevent Alzheimer's diseases progresivity.[2,3]

Until now, the pathogenesis of Alzheimer's disease is not definitely explained. But, brain cholesterol deficiency is being important risk factor in the pathogenesis of Alzheimer's disease. Brain cholesterol is almost completely dependent on in situ synthesis of apoenzyme E-cholesterol by astrocytes. Apoenzyme E (Apo-E) is one of known apolipoprotein to exits in the cerebrospinal fluid and to transport extracellular lipids and cholesterol in the brain. Apo-E is synthesized in large amounts by astrocytes which allows them to extract the contents of intermediate-density lipoprotein (IDL) and low-density lipoprotein (LDL) particles arriving from the bloodstream.[4] Disfunction of Apo-E would be influence brain cholesterol metabolism. Glycation is an early hallmark occuring Apo-E disfunction in Alzheimer's patient and causes amyloid β (Aβ) protein disfunction. Glycation usually occurs in diabetes mellitus.[5,6]

Cholesterol is an essential cellular membranes components which helps maintain physiologically important neuronal functions as neurotransmitter release, neurite outgrowth, and synaptic plasticity. Neuron membranes and myelin sheaths are components which need cholesterol for their synthesis. Lack of cholesterol will disintegrate cell membranes and will prevent cell neuron myelin sheaths synthesis which are, respectively, a place involving a microbe invasion and signalling transmission disruption. Myelin sheaths plays an important role in accelerate the transmission of signals. Transmitting of nerve impulses in myelin neurons will be more rapid than unmyelinated neurons because when they travel down a myelinated axon, they appear to leap from ranvier node to other ranvier node (saltatory conduction).[7]

Disruption of signal transmission will increase intracellular glutamat neurotransmitter production, allowing increased release glutamate into the sypnatic cleft. Excess of glutamate

neurotransmitter cause oxidative stress in neurons. Astrocytes has a pivotal role in glutamate reuptake process in the synaptic cleft. Glutamate reuptake mechanism is not occur in Alzheimer's disease.[6]

Oxidative stress stimulates disruption on neuron cell membranes. The mitochondrial free radical synthesis via pentose phosphate pathway is crucial to aggravate oxidative stress in Alzheimer's disease. Microglia which recognize cell's disruption will allow calsium influx, resulting neuron cells apoptosis.[6]

REFFERENCES

1. Holtzman DM, Morris JC, Goate AM. Alzheimer's disease: the challenge of the second century. Sci Transl Med. 2011;3(77):77sr1.
2. Tanna S. Priority Medicines for Europe and the World "A Public Health Approach to Innovation". 2013. http://apps.who.int/medicinedocs/documents/s20245en/s20245en.pdf.
3. Tejada-Vera B. Mortality From Alzheimer's Disease in the United States: Data for 2000 and 2010. NCHS Data Brief. 2013. http://www.cdc.gov/nchs/data/databriefs/db116.htm.
4. Chen X, Hui L, and Geiger JD. Role of LDL cholesterol and endolysosomes in amyloidogenesis and Alzheimer's disease.J Neurol Neurophysiol. 2014;5(5): 236.
5. Citron M. Alzheimer's disease: strategies for disease modification. Drug Discovery. 2010. 9(2) : 87-97 ab.
6. Senef S, Wainwright G, Mascitelli L. Nutrition and Alzheimer's disease: The detrimental role of a high carbohydrate diet. Eurs Intern Med. 2011. doi:10.1016/j.ejim.2010.12.017.
7. Tortora GJ., Derrickson BH. Principles of anatomy and physiology. 12th edition john wiley. 2009. International student version. pp: 415-25.