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Risk factors in induction and progression of Alzheimer's disease: Impact on protection and disease-modifying factors

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Overview of Alzheimer's disease and its Progression:

Alzheimer's disease (AD) is a progressive neurodegenerative disorder that leads to memory loss and nerve cell death throughout the brain. It is a growing public health problem with major socioeconomic burden and often causes complications resulting in death. AD progresses gradually, the progression of the disease is time dependent and just starts spread spontaneously. The rate of progression varies greatly; brain shrinks dramatically over time, plaques and tangles spread affecting nearly all brain functions. There is a lack of data in understanding AD progression. Typically, it progresses slowly in three general stages mild, moderate and severe. In its early stages memory loss is mild, but with late-stage AD individuals lose the ability to carry on a conversation and respond to their environment. Scientists hope to model stages and progression of AD. By identifying the stage of the disease, prediction is possible, symptoms can be expected and the power to find real treatment will be enhanced.

Alzheimer's disease Risk Factors:

Much attention has been paid to AD risk factors and disease-modifying factors. A number of factors may increase the chances of developing the disease. Some risk factors can be changed or controlled while others cannot. Risk factors mainly include age, genetics, environment and lifestyle. The majority of AD occurs as a result of complex interactions among genes and other risk factors. A connection has been found between a gene called Apolipoprotein E (ApoE) and the development of AD. Modifiable or controlled risk factors include stress, heavy smoking, excessive alcohol drinking, depression, cognitive inactivity or low education, malnutrition and physical inactivity. Exposure to stress represents a risk factor in induction and progression of AD especially in the developed countries, while protein malnutrition (PM) which increases the severity and progression of AD represents socioeconomic problem in the third world and developing countries. On the other hand, researchers believe that depression is a risk factor, whereas others believe it may be an early symptom of the disease. Other medical conditions that can increase chances of developing dementia include diabetes, high blood pressure, obesity, Parkinson's disease, Down syndrome and some other learning disabilities. The risk of developing AD or vascular dementia appears to be increased by conditions that damage the heart or blood vessels. Scientists hope to prevent or delay AD especially in the high-risk individuals.

Protection and Disease-Modifying Factors:

Healthy aging and lifestyle can help reduce the risk of Alzheimer's disease and other dementias. Cognitive engagement, physical activities, reduce stress, quitting or reducing smoking, avoid excessive alcohol consumption have been associated with decreased risk of AD. Healthy food as well as dietary supplementation of antioxidants, B vitamins, polyphenols, polyunsaturated fatty acids, Zinc and moderate coffee drinking can reduce AD incidence and provide protection. Although the mechanisms of these nutrients on AD are not clear, but reducing oxidative stress, inflammatory mediators and both Aβ & tau pathologies can attenuate cognitive deterioration.

On the other hand, some combined treatments showed marked protective effects rather than individual treatments in animal experimental models especially with risk factors. For example, combined therapy of Epigallocatechin-3-gallate (EGCG) and coenzyme Q10 (CoQ10), EGCG and vitamin E & selenium, combined use of vitamin C and vitamin E as well as co-administration of caffeine and nicotine. The deleterious effect of stress on the brain can be also counteracted by using both EGCG and Diazepam. However, further researches are needed to improve the quality of evidence associated with the reduction of AD prevalence and incidence.

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