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Alzheimer's Disease

Alzheimer's disease is one of the most common forms of Dementia in people ages 65 and older. It is currently irreversible, and it cannot be cured. Dementia refers to a set of symptoms that are caused by gradual changes in brain function and lead to the general inability to carry out day to day tasks.

Alzheimer's disease attacks the brain by causing gradual nerve cell death, beginning in the hippocampus and eventually spreading across the entire brain. A person with Alzheimer's has abnormal nerve cells that are found in the hippocampus and the amygdala. In the hippocampus a process called Long-term potentiation occurs as an essential part of memory storage. Sometimes this process can be over stimulated and cause apoptosis in the postsynaptic neurons. This form of cell death is believed to be caused by a mutation in the nerve cells known as excitotoxicity. Excitotoxicity occurs when the neurotransmitter glutamate binds to the postsynaptic membrane in such a way that it allows too much calcium to enter. Normally, calcium is needed in the formation of memory, though when too much is present it kills the cell.

Excitotoxicity is not the only form of cell death in an Alzheimer's patient. Those with Alzheimer's disease have abnormal nerve cells that progress throughout the brain, though start in areas where excitotoxicity occurs. These abnormalities are known as plaques and neurofibrillary tangles. These plaques develop because a person with Alzheimer's produces too much beta amyloid protein. In healthy cells the plasma membranes produce the enzyme secretases that seperate the protein from larger molecules. When too much beta amyloid is present the enzyme

cannot fight the development of large bodies of the protein that eventually surround the axon. These bodies of beta amyloid will eventually set off an inflammatory reaction that destroys the nerve cell. Neurofibrillary tangles develop as a result of the inability of the nerve cell to correctly produce the protein Tau. Tau is a protein created in nerve cells that is designed to hold microtubules in place that form the structure of the neuron. In an affected nerve cell, the Tau proteins are misshapen, and begin attaching themselves to each other. These Tau protein clumps hold the microtubules of the neuron in the wrong places, creating tangles.

It is estimated that around 4.5 million Americans currently live with Alzheimer's disease. Those who are most at risk for Alzheimer's disease generally are ages 65 and older, and approximately five percent of Americans aged 65 to 74 are suffering from the disease. Nearly fifty percent of persons 85 and older are thought to have the disease. The risk of contracting the disease doubles about every 5 years after 65. Alzheimer's disease is not a normal part of aging.

Alzheimer's disease is generally classified into two types, early-onset and late-onset. The progression and effects of both forms is the same. On average, patients with Alzheimer's Disease live between 8 to 10 years, though the range can be anywhere from 3 to 20 years. Late onset Alzheimer's occurs in people over 65 and is the most common form of Alzheimer's. Late onset Alzheimer's is linked to age and family history. Early-onset is far more rare and can occur in someone as early as their mid to late 30's. A deterministic gene (meaning that if inherited the disease will develop) is found in around 100 families across the world and accounts for less than five percent of all known cases. Another gene called apoliprotein E-e4 (APOE-e4) has been known to increase risk of contracting Alzheimer's and can make symptoms appear earlier in life.

Alzheimer's disease is very difficult to diagnose. It requires professional assessment from

a specialist, and its symptoms are varied as the disease progresses over time. Though there is no cure for Alzheimer's, early detection is imperative to the well-being of the patient and their caretakers. There is no single test in determining Alzheimer's disease in a patient, so it is important to be familiar with the symptoms associated with the disease. Alzheimer's patients progress through 7 stages of development beginning with mild memory lapses and ending with the complete inability to care for themselves. Alzheimer's patients have the general inability to form memories, and their memory deteriorates over time. They may become anxious or agitated constantly, wander away from home, forget entire experiences, people or names may be forgotten especially in late stages of development, they may become delusional or be subject to hallucinations, and they may lose control of basic bodily functions (like using the bathroom) in late stages of development. While many of the early symptoms exhibited by Alzheimer's patients can appear normal, they occur much more frequently in those with the disease. The ten major warning signs according to the Alzheimer's Association are: memory loss, difficulty performing familiar tasks, problems with language, disorientation to time and place, poor or decreased judgment, problems with abstract thinking, misplacing things, changes in mood or behavior, change in personality, and loss of initiative. A person with normal aging memory problems can forget parts of experiences but generally has the ability to form memories and care for themselves. A person with Alzheimer's disease usually will not remember past experiences and cannot care for themselves.

Alzheimer's disease is fatal. Though a number of treatments are currently available, they help relieve symptoms of the disease but cannot stop the progression of the disease. Early detection usually increases the benefit from such treatments, and also allows more time to plan

for appropriate care for the patient. The FDA (U.S. Food and Drug Administration) has two types of approved prescriptions given to Alzheimer's patients in order to treat the memory and cognitive related symptoms. The first type is cholinesterase inhibitors. They are regularly prescribed as donepezil (Aricept), rivastigmine (Exelon), and galantamine (Razadyne). These drugs are designed to stop the breakdown of acetylcholine, which is essential in memory development. A second type of drug is designed to prevent further cases of excitotoxicity in nerve cells of the brain. Memantine (Namenda) is designed to treat moderate to severe Alzheimer's disease by acting as a glutamate regulator. By regulating levels of glutemate in the brain, the chance of an overexcited nerve cell allowing too much calcium is reduced. Memantine does this by partially blocking the receptors in the postsynaptic membrane.

Alzheimer's patients may also suffer from behavioral and/or psychiatric symptoms such as anxiety, insomnia, agitation; they may shred paper or tissues, uncontrolled yelling, delusions, and hallucinations. Doctors tend to prescribe one of three types of medications (Antidepressant, Anxiolytics, and Antipsychotic) in order to deal with these symptoms, though they may set up counseling or other forms of non-medicated intervention.

There are also a number of alternative treatments available, though their effectiveness is currently unknown. These treatments include but are not limited to: vitamin E supplements, Coenzyme Q10, Ginkgo biloba, Huperzine A, Omega-3 fatty acids, Phosphatidylserine, and coral calcium supplements.

Sources

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