

The **Midlands Chapter** provides programs and services to those affected by Alzheimer's disease in a 16 county service area.

The Chapter is a not-for-profit organization of volunteers, laypersons and healthcare professionals committed to working together to accomplish our mission. Founded in 1982, the Chapter is a member of the National Alzheimer's Association located in Chicago, Illinois.

### **Vision Statement**

A world without Alzheimer's disease.

### **Mission Statement**

To eliminate Alzheimer's disease through the advancement of research; to provide and enhance care and support for all affected; and to reduce the risk of dementia through the promotion of brain health.

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### **Midlands Chapter**

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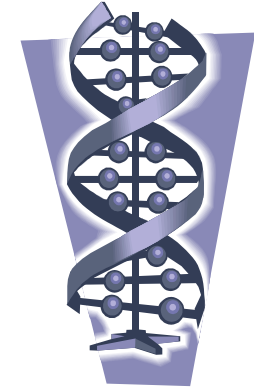
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### **Midlands Chapter**

## **Down syndrome & Alzheimer's disease**

*"A Genetic Link?"*



Although several theories exist as to why individuals with Down syndrome develop Alzheimer's disease (AD), one of the leading hypotheses is based on a gene located on chromosome 21.

Trisomy 21 is the cause of approximately 95 percent of all cases of Down syndrome. A gene located on chromosome 21, the amyloid precursor protein gene (APP), is one of three early-onset familial AD genes.

Because individuals with Down syndrome have an additional chromosome 21, resulting in three copies of the APP gene instead of two, it is thought that not only is APP abnormally processed but it also is producing beta amyloid at 1.5 times the normal rate.

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## **New Research Strengthens an Unusual Relationship**

AD is a degenerative neurological disorder that strikes in middle age or later, slowly killing brain cells and affecting memory and cognition. Down syndrome results from a genetic abnormality that causes mental retardation and specific facial and bodily characteristics at birth in one out of every 1,000 individuals. At first glance, the two disorders seem to have little in common.

Because of people living longer, the number of individuals with Down syndrome developing AD "old age" (50 or above) has grown, motivating scientists to study potential connections between the two conditions.

Individuals with Down syndrome are at much higher risk for AD than individuals in the general population. In fact, researchers have found that nearly all individuals with Down syndrome who live past 60 develop dementia due to AD.

Those with Down syndrome are not only at higher risk for AD but also begin exhibiting symptoms at a much younger age – most often in their late 40's and early 50's – nearly 20 years earlier than most individuals with AD in the general population.

## **A Shared Neuropathology**

Amyloid plaques and neurofibrillary tangles are the two characteristic lesions of AD. One of the first connections made between AD and Down syndrome came after scientists discovered that, at autopsy, Down syndrome brains are nearly identical to AD brains and are riddled with plaques and tangles.

Most individuals with Down syndrome begin to develop AD-like changes in the brain before age 20, significantly earlier in life than individuals in the general population. Some cases have even documented the deposition of amyloid in the brains of individuals with Down syndrome as early as age 10.

Regardless of when amyloid deposition in the Down syndrome brain begins, the full-blown pathological characteristics of AD become apparent by ages 35-40. At this time, not only the presence of plaques and tangles are detected in Down syndrome, but also a deficit in acetylcholine, which occurs in the AD brain nearly two decades later.

## **Familial Risk**

Risk of AD in families with a history of Down syndrome may be higher than average. Nicole Schuft, PhD, of the New York State Institute for Basic Research, and colleagues found that women *under age 35* who gave birth to Down syndrome children were at higher risk for AD later in life than women *over 35* (who are more likely to have children with Down syndrome than young mothers). Fathers of Down syndrome children have not been found to be at higher risk for AD. Although this research has yielded interesting results, further studies are needed to confirm these findings.



## **New Research**

Scientists have found that antioxidants may help protect the AD brain from neuronal damage brought on by oxidative stress. It has been known for several years now that an excess of free radicals also can be found in the Down syndrome brain.

"The links between AD and Down syndrome have yet to be fully uncovered," says Jorge Busciglio, PhD, of the University of Connecticut Health Center. "My research team is attempting to establish a stronger link by studying the causes and effects of oxidative stress in the AD brain and Down syndrome brain."

Busciglio is investigating the effects of free radicals on Down syndrome neurons in culture. His study focuses on the high accumulation of free radicals observed in the Down syndrome brain and whether oxidative stress can be linked to an over expression of the gene coding.

"The neuropathologies of these two conditions are identical," says Busciglio. "However, we need to find out whether both conditions share a common pathway or whether two very diverse pathways are leading us to the same endpoint."

## **Symptoms, Diagnosis, and Treatment**

The symptoms of AD may be, in the disease's early stages, slightly less noticeable in individuals with Down syndrome than in individuals in the general population because cognitive or memory loss may be masked by the severity or degree of mental retardation.

Some of the most easily detectable symptoms of AD in an older individual with Down syndrome are a sudden change in ability to complete activities of daily living (e.g., dressing, eating, bathing), withdrawal from daily and social routines, aggression, frustration, and lack of interest in regular activities. These behavioral symptoms are sometimes more accurate warning signs of AD in individuals with Down syndrome than are cognitive symptoms.

Because current memory and cognitive assessment tests are not tailored for individuals with Down syndrome and other developmental disabilities, it may be more challenging to obtain an accurate diagnosis. Research into developing tailored assessments for individuals with developmental disabilities has been identified as an important area of research and is ongoing.

"Studying the changes that take place in the brains of individuals with Down syndrome may lead to further understanding of AD in individuals in the general population," says David Holtzman, MD, associate professor neurology at Washington University School of Medicine in St. Louis. "Someday we may be able to develop more effective treatments, maybe even a combination of treatments that will benefit individuals suffering from either condition or both."

"Individuals with Down syndrome serve as a unique population for the study of preventive treatments for AD," says Holtzman, "simply because everybody with Down syndrome is at risk for AD."

*Information in this brochure was taken from Research & Practice, Winter 1999, Vol.6, No.4, A National Alzheimer's Association publication.*