
Genetic Testing

COMMON QUESTIONS

- Is there a genetic test that accurately predicts Alzheimer's disease?
- Under what conditions should such a test be administered?
- What are the potential risks associated with genetic testing for Alzheimer's disease?

BACKGROUND INFORMATION

The cause of Alzheimer's disease remains unknown, but some risk factors — characteristics that increase the incidence of the disease — have been identified. The greatest risk factor for Alzheimer's disease is age.

Scientists have found some of the genes that contribute to the risk of Alzheimer's disease. More than 100 genes are suspected to confer greater susceptibility for developing late-onset (old age) Alzheimer's disease, the most common form of the disease. Inheritance of a handful of these genes has been clearly linked to higher risk. The gene with the largest impact on risk is APOE (on chromosome 19), which encodes the protein apolipoprotein E. People with one copy of APOE-ε4 have a greater risk (about threefold) of getting Alzheimer's disease than people with other forms of the gene, and people with two copies of APOE-ε4 have an even greater risk. However, having one or two copies of the APOE-ε4 gene does not necessarily mean a person will develop Alzheimer's disease.

At this time, the presence or absence of the ε4 form of the APOE gene is not used to determine a course of treatment either before or after the symptoms of dementia appear. Although tests for this gene are available, knowing the gene is present or not may invite other issues, such as anxiety about getting the disease or discrimination in obtaining disability or long-term care insurance. Genetic tests to determine susceptibility to Alzheimer's disease would only be of value in a research setting investigating the role of genes in the onset and progression of the disease.

A small minority of cases of Alzheimer's disease are of the younger-onset (early-onset) form, in which symptoms appear in a person's 50s or earlier. Only a proportion of these early-onset cases are linked to mutations identified in three genes: APP (on chromosome 21), PSEN1 (on chromosome 14) and PSEN2 (on chromosome 1). This is also referred to as familial Alzheimer's disease. If someone has one of these gene mutations, there is a high degree of certainty (approaching 99 percent) he or she will develop the disease, depending on the age of the individual being considered. Such cases of "autosomal dominant" Alzheimer's disease are very rare, accounting for less than 1 percent of all dementia cases worldwide. It is unclear what the cause is for the other substantial proportion of individuals affected by Alzheimer's disease.

Affected families are usually well aware of their unusual history with the disease. For members of these rare families, a genetic test could indicate whether an individual carries the gene

mutation and will develop the disease. Some members of these families may wish to know their genetic status (for planning and decision-making), but others may not.

ASSOCIATION POSITION

The genetics of Alzheimer's disease and related dementias (such as frontotemporal dementia, Lewy Body dementia, etc.) varies from one disorder to another. The Association does not recommend routine genetic testing for Alzheimer's disease for the general population. Genetic tests to determine susceptibility to Alzheimer's disease would only be of value in a research setting investigating the role of genes in the onset and progression of the disease. If genetic testing could productively guide medical treatment, the ethical issues surrounding its use would be reconsidered.

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Genetic Testing Bibliography

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