Multiple System Atrophy

Subjects: Genetics & Heredity
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Multiple system atrophy is a progressive brain disorder that affects movement and balance and disrupts the function of the autonomic nervous system. The autonomic nervous system controls body functions that are mostly involuntary, such as regulation of blood pressure. The most frequent autonomic symptoms associated with multiple system atrophy are a sudden drop in blood pressure upon standing (orthostatic hypotension), urinary difficulties, and erectile dysfunction in men.

Keywords: genetic conditions

1. Introduction

Researchers have described two major types of multiple system atrophy, which are distinguished by their major signs and symptoms at the time of diagnosis. In one type, known as MSA-P, a group of movement abnormalities called parkinsonism are predominant. These abnormalities include unusually slow movement (bradykinesia), muscle rigidity, tremors, and an inability to hold the body upright and balanced (postural instability). The other type of multiple system atrophy, known as MSA-C, is characterized by cerebellar ataxia, which causes problems with coordination and balance. This form of the condition can also include speech difficulties (dysarthria) and problems controlling eye movement.

Multiple system atrophy usually occurs in older adults; on average, signs and symptoms appear around age 55. The condition worsens with time, and affected individuals survive an average of 10 years after the signs and symptoms first appear.

2. Frequency

Multiple system atrophy has a prevalence of 2 to 5 per 100,000 people.

3. Causes

Multiple system atrophy is a complex condition that is likely caused by the interaction of multiple genetic, environmental, and lifestyle factors. Some of these factors have been identified, but many remain unknown.

Changes in several genes are being studied as possible risk factors for multiple system atrophy. The genetic risk factors with the most evidence are variants in the *SNCA* and *COQ2* genes. The *SNCA* gene provides instructions for making a protein called alpha-synuclein, which is abundant in normal brain cells but whose function is unknown. Studies suggest that several common variations in the *SNCA* gene are associated with an increased risk of multiple system atrophy in people of European descent. It is unclear whether these variations also affect disease risk in other populations. The *COQ2* gene provides instructions for making a protein called coenzyme Q2. This enzyme carries out one step in the production of a molecule called coenzyme Q10, which has a critical role in energy production within cells. Variations in the *COQ2* gene have been associated with multiple system atrophy in people of Japanese descent, but this association has not been found in other populations. It is unclear how changes in the *SNCA* or *COQ2* gene increase the risk of developing multiple system atrophy.

Researchers have also examined environmental factors that could contribute to the risk of multiple system atrophy. Initial studies suggested that exposure to solvents, certain types of plastic or metal, and other potential toxins might be associated with the condition. However, these associations have not been confirmed.

In all cases, multiple system atrophy is characterized by clumps of abnormal alpha-synuclein protein that, for unknown reasons, build up in cells in many parts of the brain and spinal cord. Over time, these clumps (which are known as inclusions) damage cells in parts of the nervous system that control movement, balance and coordination, and autonomic functioning. The progressive loss of cells in these regions underlies the major features of multiple system atrophy.

3.1. The Genes Associated with Multiple System Atrophy

- COQ2
- SNCA

4. Inheritance

Most cases of multiple system atrophy are sporadic, which means they occur in people with no history of the disorder in their family. Rarely, the condition has been reported to run in families; however, it usually does not have a clear pattern of inheritance.

5. Other Names for This Condition

- MSA
- OPCA
- progressive autonomic failure with multiple system atrophy
- SDS
- Shy-Drager syndrome
- sporadic olivopontocerebellar atrophy

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