



GENETIC TESTING FOR MOTOR NEURONE DISEASE

Introduction

This information leaflet has been prepared for people who have asked about genetic testing, or donating blood to further research into Motor Neurone Disease (MND).

What is MND?

The term MND is used to describe a progressive degenerative disorder of certain nerve cells in the spinal cord and brain called 'motor neurones'. Loss of these cells results in weakness and wasting of the muscles. The disorder usually starts in middle life and once symptoms appear, life expectancy is generally 2-6 years, although it can be longer or shorter.

The age at which symptoms of MND appear in people with faulty SOD1 genes varies greatly. It can be as early as the 20s and as late as the 80s. As well, the age of onset can vary considerably within a family, even though the mutation carried by family members is the same.

About 10 percent of MND is 'familial'; that is, there has been more than one affected person in the family. About 90% of those with MND are the only affected people in their family and are said to have 'sporadic' MND which is not inherited. The average age of onset of sporadic MND is around 55 years and of familial MND is around 45 years.

Some people with familial MND have the disorder because of a mutation in one particular gene. A mutation is an error in the genetic code which causes a gene to work abnormally. This gene is called the superoxide dismutase 1 gene (SOD1) and is located on chromosome 21.

About 15% of familial MND is caused by mutations in the SOD1 gene.

People who inherit a faulty SOD1 gene have a high, but as yet uncertain, chance of developing MND in later life. However, some people with a mutation in their SOD1 gene will not develop MND during their lifetime.

If a person has MND as a result of a mutation in SOD1, each of their children has a 50/50 chance of inheriting the faulty gene.

Some people who appear to have sporadic MND also have mutations in the SOD1 gene. The proportion is not known.

Mutations in other genes, as yet unidentified, can cause familial MND.

Current research

There has been, and continues to be, wide-ranging research on familial MND. Researchers are carrying out further studies:

- to understand how MND is caused by faults in SOD1;

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- to work out how many familial and sporadic cases of MND result from mutations in SOD1;
- to work out how many of those with a faulty SOD1 gene will actually go on to develop MND later in life;
- to identify mutations in other genes which may cause familial MND; and
- to discover ways of preventing and treating familial and sporadic MND.

Relevance of the discovery of the SOD1 gene

It is now possible to test for mutations in the SOD1 gene. To date, over one hundred different mutations have been identified in this gene.

If the MND is caused by a SOD1 mutation:

- it is possible to test other family members to determine if they also have the SOD1 mutation. For example the adult children or brothers and sisters of an affected person could be tested;
- it is possible to test an unborn child to determine if it has inherited the SOD1 mutation; and
- it is not yet possible to predict the age at which symptoms will appear in those shown to have a SOD1 mutation, and some may never develop symptoms.

Research will increase our understanding of the mechanism by which SOD1 mutations cause MND, and may lead to treatments which can prevent or delay the onset of MND in someone with a defective SOD1 gene.

It is possible that research on MND caused by SOD1 mutations will also contribute to our understanding of the causes of other types of MND.

Some issues associated with testing for SOD1 mutations

Why might I want to know if I have the gene?

- because I am the sort of person who wants to know as much as possible about myself and my future and find it hard to live with uncertainty.
- to enable me to plan my life;
- to help with decisions about marriage and having a family;
- to provide information of importance to my children;
- if I do not have the gene, the information may help when I apply for jobs, life insurance, superannuation or when taking on long-term financial commitments; and

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- if I have the gene, and it becomes possible to prevent MND, I can make use of the preventative measures

Why might I not want to know if I have the gene?

- I can accept living with uncertainty and will be able to plan my life without knowledge of my genetic status;
- I would not change my plans regarding marriage and having a family, whatever the test result;
- I do not think I would cope with knowing that I have the gene and will have a high risk of developing MND;
- if I have the gene, the information may limit my life opportunities for example, in relation to career choices, life insurance, superannuation and financial matters;
- relationships with my family, friends and workmates may change if I am shown to have the gene; and
- I am always free to change my mind and can take the test in the future if, for example, a treatment becomes available that can prevent MND.

Can children be tested?

In general, children under 18 years of age should not be tested. Anyone having this test must be able to give consent. They need to understand and accept the testing process and the implications of the test result. This is a test which can give an indication of a person's future health and the results can have tremendous effects on various aspects of life.

The right of parents to have information about their child does not outweigh the child's right to make a personal choice about whether or not to be tested.

Testing must be voluntary

While each person will consider the views and feelings of family and friends, the final decision must be taken by the individual concerned. It would be inappropriate for someone to take the test because of pressure to do so.

How is the test performed?

The test is usually done on genetic material (DNA) obtained from a blood sample.

Those wishing to be tested need information and counselling from health professionals with expertise in this form of testing and must give written consent.

Can DNA be stored?

DNA can be stored frozen, so blood from people with the disorder can be collected now and used in the future to help other family members.

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Can I give a blood specimen for research, but without getting the result?

Researchers are keen to receive blood samples from people with a family history, particularly if testing for the SOD1 mutation has proved to be negative in that family. (SOD1 mutations are found in only about 15% of cases of familial MND, and genes that cause most cases of familial MND are yet to be identified).

If you would like to support research in this way, please contact your local MND Association to check if arrangements are in place for you to donate a blood sample.

If a person who has donated blood for research purposes wishes to find out at a later date whether they have a genetic mutation for familial MND, it would be necessary to follow the standard procedure of counselling and genetic testing as detailed above.

Will the test result be kept confidential?

The result will not be released to others without the formal consent of the person tested.

Who can provide support for those taking the test?

Family, close friends or other trusted people close to the individual can provide emotional support, as can health professionals such as doctors, (clinical geneticists, neurologists, psychiatrists, general practitioners), MND Associations, counsellors (including genetic counsellors), and social workers.

Testing needs to be offered as part of a formal program providing all the information, counselling and support a person might need when trying to decide whether to have the test, and after the result has been given.

To find out more about genetic testing, contact one or more of the following:

- your regional clinical genetics service;
- the neurologist who is treating, or treated, the person in your family with MND; and
- your local MND Association.

The MND Associations – what role do they play?

- Provide guidance and advice for people with MND, families and health professionals
- Produce and disseminate information
- Fundraise and advocate to promote further research.

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- Advocate for the development of clinical programs which have a written protocol and provide full counselling and support for those taking the test
- Promote the sharing of knowledge and experience as research proceeds and clinical testing programs expand
- Support clinical programs which provide diagnostic testing

GENETIC SERVICES

Genetic Counselling Clinics operate at many different locations throughout Australia. For further information about genetic testing and related matters contact one of the following services to find out about your nearest Clinic.

VICTORIA

Genetic Health Services Victoria
Royal Children's Hospital, Parkville VIC 3052
Phone: (03) 8341 6201

MND ASSOCIATION

MND Association of Victoria Inc.
PO Box 23, Canterbury 3126
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