



# Inherited Motor Neurone Disease

## Part one: Introduction to inherited motor neurone disease

This publication gives information about the rare inherited form of motor neurone disease (MND), which is sometimes known as familial MND.

A small proportion (5-10%) of people with MND have a family history of the disease. This form of MND is known as familial, or inherited, MND. Inherited MND is caused by a mistake in the genetic code that holds the instructions for making every protein in our bodies; this mistake may be passed down from one generation to the next.

This information sheet is **part one** of our information on inherited MND.

**Part two** looks at genetic testing and how a diagnosis of inherited MND can affect insurance.

**Part three** explains the options available to affected family members who may wish to start a family.

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## Introduction

If you have been diagnosed with MND, but none of your relatives have been affected by the disease (family history), you may be wondering whether there is a risk to other family members.

The majority of cases of MND are likely to be caused by many small contributory risk factors, including subtle genetic, environmental and lifestyle influences. These factors in combination may then 'tip the balance' towards someone developing the disease.

Although your genetic make-up (subtle individual genetic differences unique to that individual) may have made a small contribution to you getting MND, the disease was probably not directly caused by a major mistake in your genetic code. This means that the risk to your siblings and children is therefore still very small.

### **More information:**

Research Information Sheet A: Overview of MND research

**The rest of the information sheet applies to situations where people do have a family history of the disease.**

## The importance of taking a family history

### **I have been diagnosed with MND and I do have a relative with the disease. Does this mean MND runs in my family?**

Because of the way that MND may be inherited (see diagram on page 5) it does not often skip a generation. A strong indication of whether someone has inherited MND would be if a parent, uncle, aunt or sibling has been affected. When you see a MND specialist for a consultation, they will discuss your family history with you to try and establish whether or not you could have an inherited form of the disease.

The diagnosis of inherited MND is only given if you have a strong family history. In some cases it may be possible for you to have a genetic test to find out which gene is causing MND in your family, however there are still a small proportion of genes which have not yet been identified through research, so testing for these will not be available at present.

When you are newly diagnosed with inherited MND, your extended family will need informed support. They may have seen MND close at hand and may frequently recognise the symptoms before a formal diagnosis is given.

It is important that your health professionals are aware that MND can be inherited and it is therefore important to ensure that they take a full family history.

### **What do I need to find out about my family history?**

Before the consultation, it is a good idea to speak to older relatives to build up as much knowledge as possible about the family's medical history. Make a note of any relatives who perhaps had speech or mobility problems towards the end of their life, even if they were not actually diagnosed with MND.

It is important that you mention any family history of unusual behaviour to your doctor, as well as any cases of MND.

Recent research has found a link between a family history of MND and a family history of frontotemporal dementia (FTD). Frontotemporal dementia is an increasingly recognized form of dementia, with different signs and symptoms to the more common Alzheimer's Disease. **Your doctor will therefore be interested to know about any relatives who were diagnosed as having frontotemporal dementia.**

#### **More information:**

Care Information Sheet 9A: Will the way I think be affected?

The doctor will probably ask about the age at which your relatives died. This is because MND, even when it is inherited, tends to occur later in life. A relative who died young of other causes may not have developed MND, yet may still have carried a disease-causing gene and passed it on to their children. On the other hand, a relative who died at an old age without being affected by MND is less likely to have carried the disease-causing gene.

### **Which family members do I need to find out about?**

Of most importance is the medical history of first degree relatives; by this we mean parents, brothers and sisters. The doctor will also be interested to know about aunts, uncles and grandparents. Remember that it is only the history of family members who are genetically related to you ('blood relatives') that will have any bearing on your health. The history of aunts and uncles who are related to you by marriage is not relevant. Equally, your own spouse or partner's family history does not have any bearing on whether or not your disease is inherited.

## **How MND can be inherited**

### **Is there any pattern in the way that inherited MND is passed on?**

The instructions for the way that our bodies develop and function are provided by genes. We have two copies of genetic instructions for every hereditary characteristic: one copy provided by our father and one copy provided by our mother.

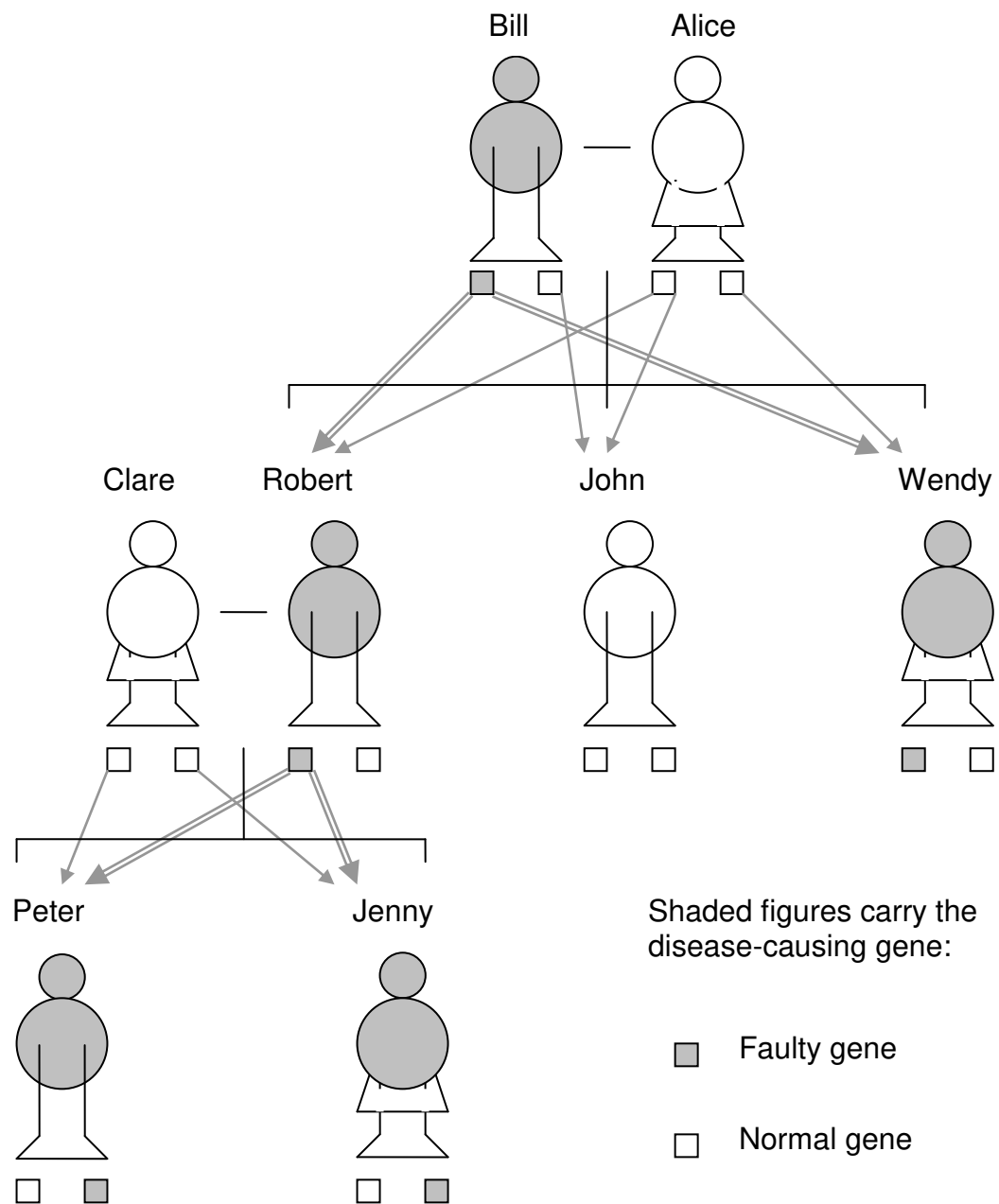
Inherited MND is passed down from one generation to the next when somebody inherits a certain faulty, or mutated, gene from one of their parents. Inherited MND nearly always follows what is known as a dominant inheritance pattern. This means that it only takes one faulty copy of the gene to cause the disease: a person with the inherited form of MND will have one faulty copy and one normal copy.

The diagram on page 5 shows the basic pattern of MND inheritance, using an example of a fictional family – the genes that determine whether or not somebody inherits MND are represented by boxes. It is important to discuss your own family history with a neurologist as this diagram represents a simplified scenario.

### **Have I passed the disease on to my children?**

As the diagram shows, an affected parent can pass on either their faulty copy of the gene or their normal copy to each child. For example, Bill has passed on the faulty gene to Robert and Wendy and the normal gene to John. John is at no greater risk of getting MND than somebody who does not have MND in their family.

## Pattern of MND inheritance



With **each** pregnancy, the child has a one in two (50%) risk of inheriting the disease-causing gene. Just as it's possible to get two tails in a row when tossing a coin, it is possible that the two children of an affected parent will both inherit the faulty gene (see Peter and Jenny in the diagram). The 50% risk is always the same; it is independent of the child's gender, or whether they share more characteristics (such as eye and hair colour or personality) with the unaffected parent or the affected parent.

**Does the disease always start in the same way in each affected member of a family?**

No. Within the same family, the first symptoms of MND can appear at different ages and in different parts of the body. For example, Peter may experience his first symptoms in his forties, whereas Jenny may not get MND until her sixties. Both have carried the same mistake in their genetic code all their life but the disease has taken different amounts of time to appear. This tells us that there are other factors influencing disease onset in inherited MND.

Even if you have a MND-causing gene, you may not ultimately go on to develop the disease – this faulty gene may only increase your risk of developing MND in the future.

**Managing your reactions to inherited MND**

A diagnosis of MND can give rise to some very difficult feelings and emotions, but when you have the inherited form of MND these can be even more complex.

For example, you may feel concerned about the possibility that the faulty gene has been passed on to your children. Fears about how MND may affect future generations of your family are natural. You may experience feelings of guilt, anxiety and depression, but talking to your health care team may help you to manage these more difficult emotions.

If you have distant or estranged family members, you may find it difficult to raise the issue of inherited MND, and the possibility that they are also at risk. It is important to know that you are not on your own and a number of experienced healthcare professionals can help and support you with this. It can also be helpful to find out about healthcare professionals who can support family members in their areas, as they come to terms with the situation, by contacting MND Connect or speaking to your GP.

If someone else in your family has been diagnosed with inherited MND, you may become preoccupied with the uncertainty of whether or not you will be affected by the disease. You may even experience feelings of guilt if you remain unaffected or have not inherited the faulty gene.

It is not uncommon to worry that any sign of clumsiness, muscle twitching or muscle cramps are signs of MND. If you are concerned, please speak to your GP who should be able to refer you to an experienced neurologist.

These are just a few examples of how a diagnosis of inherited MND can affect you and your family. It is important to know that these feelings are natural and that emotional support is available. You may wish to discuss your feelings with your GP, or counselling may help you to find new ways of coping with the feelings you are experiencing.

## Care and support

We acknowledge that this information sheet regarding inherited MND is a lot to take in, and will raise lots of questions. The care required by someone with inherited MND is no different to a person who has the non-inherited form of the disease and the MND Association has a range of services available to help.

*If you would like to discuss any of these issues further then please contact  
MND Connect on 0808 802 6262  
or the Research Development team on 01604 611880*

### **I would like to know about genetic testing**

If you have inherited MND and would like to know which gene is responsible for causing the disease in your family you may be able to have a genetic test.

This will allow you to know if you have a disease-causing gene that has been shown by research to cause inherited MND (SOD1, TDP-43, FUS and C9ORF72). There are still a number of genes which have not yet been identified, so testing for these will not be available at present.

Once a disease-causing gene has been identified your unaffected family members may wish to be tested to see if they too have the gene responsible for causing MND in your family.

### **How will this affect insurance?**

A family history of inherited MND may affect life and travel insurance, which may be something that worries you and your family. It is important to know that there is a great deal of information and support available regarding this topic.

#### **More information:**

Research Information Sheet B part two: Genetic testing and insurance

### **I am worried about starting a family**

If inherited MND is in your family you may have concerns about starting a family and the risks of passing on the disease-causing gene. However, you there are a number of options that may be available to you.

#### **More information:**

Research Information Sheet B part three: Options when starting a family

### **Who can I talk to about inherited MND in more detail?**

You may be wondering who you can talk to and where you can get more information about inherited MND.

Referral to a neurologist who understands the particular needs of people with inherited MND may be helpful. For contact details of neurologists who offer this service please contact the Research Development team on 01604 611880 or email [research@mndassociation.org](mailto:research@mndassociation.org).

## **Useful resources**

The Frontotemporal Dementia Support Group (FTD SG) is particularly directed towards carers who are affected by behavioural changes caused by FTD. This group offers support, information and advice to people affected by FTD, as well as regular meetings.

Tel: 07592 540 555

Email: [jill.walton@ftdsg.org](mailto:jill.walton@ftdsg.org) / [jill.walton@ucl.ac.uk](mailto:jill.walton@ucl.ac.uk)

Website: [www.ftdsg.org](http://www.ftdsg.org)

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