GENETICS AND DEMENTIA

Dementia | Mate wareware – is it inherited?

People living with dementia | mate wareware may be concerned that this condition has been inherited and that they could pass it on to their children. Family members of people living with dementia may be concerned that they will be more likely to develop dementia themselves.

Researchers around the world are working to find out more about genetics and dementia. Currently there is more that we don't understand than there is that we do understand. This sheet outlines what is known at present.

There are two ways that our genes can be involved in causing a dementia illness:

1. Single gene abnormalities that are so powerful that anyone with that faulty gene has a very high risk of developing dementia. These conditions are rare but they often lead to strongly inherited patterns of a particular disease that causes dementia.
   For example, dementia caused by Huntington's disease. This is an "autosomal dominant" disease, which means that every child of someone with the illness has a 50% chance of getting the faulty gene and will almost certainly go on to develop the disease if they live long enough. If you do not inherit the gene, you cannot pass this condition on to your children and you will not develop the disease.

2. Multiple different genes with small effects that combine with environmental factors to raise the risk of dementia. Most diseases that cause dementia fall into this category and they are weakly inherited.

Therefore, the vast majority of cases of dementia are not strongly inherited. There can be quite a few people in a single family, often with different types of dementia illness, where this has still occurred due to chance rather than a genetic cause.

Some dementia illnesses have both inherited and non-inherited forms. Here are some examples.

Alzheimer's Disease

Alzheimer's Disease, the most common cause of dementia, is generally not strongly inherited. The most important risk factor for Alzheimer's disease is advancing age but there are also many other factors such as how active we have kept our brains, whether we have had a head injury, the state of the blood supply to our brain, whether we smoke and complex factors to do with cholesterol. Our genes contribute more strongly to some of these than others – for example, how our cholesterol is handled and how our blood supply changes as we get older. The overall genetic contribution to our risk of Alzheimer's disease is complicated, but it means that if a parent or sibling in our family has Alzheimer's disease, our own risk is increased compared to someone who does not have a "first degree relative" with Alzheimer's, assuming we live long enough to develop the disease in the first place. However, lifestyle factors are probably more important and 'mystery factors' that we know nothing about yet are the most important of all.

In less than 1% of cases, Alzheimer's disease is strongly inherited. The disease then develops at a much earlier age with individuals sometimes being affected as early as their 40s. Genes that code for three important chemicals in the brain (called APP, PS1 and PS2) have been identified as causing this early-onset or familial form of Alzheimer's disease in an "autosomal dominant" way when they are faulty. People with Down Syndrome are also at much higher risk of Alzheimer's Disease due to another genetic factor, but they do not inherit this from their parents.

Lewy Body Dementia
Lewy Body Dementia generally occurs in people with no known family history of this disease. It is likely that there are many genes that interact with each other to raise or lower our risk and it is not yet possible to make any good predictions about individuals. Rare, strongly inherited cases have occasionally been reported in some families internationally, generally occurring in relatively young adults.

Vascular Dementia
There are several different diseases that cause dementia due to poor blood supply to the brain. Genes are definitely involved in this in the same way that strokes and heart attacks can sometimes run in the family, but lifestyle factors are also very important: for example, whether we have a good diet, exercise, manage our weight, and smoke, and how well we manage these risks. Overall, these dementias are not strongly heritable. However, there are some very rare "autosomal dominant" conditions that can affect younger adults.

Frontotemporal Dementia
Less than 10% of the people with dementia have a frontotemporal dementia. It is estimated that up to 50% of people diagnosed with a frontotemporal dementia have a family history of the disease. In approximately 10% of these cases (that is, 1% of all people with dementia) this is another "autosomal dominant" condition. In the remaining 40%, family members are at moderately increased risk, probably due to unidentified genes that raise their chance significantly but don't necessarily cause the illness.

What should I do?

If dementia | mate wareware that is thought to be caused by the same type of dementia illness has occurred in multiple family members, over two or more generations, and at least one of them has occurred below the age of 60 (preferably 55), you can talk to your GP about considering a referral to a specialist to review the history. The specialist might refer on to the Genetics Service at Christchurch Public Hospital. With the current state of knowledge, it is seldom possible to find a single gene that is the culprit and it is therefore impossible to tell unaffected family members what their risks are, but occasionally specific genetic problems can be identified. Sometimes, when a family's history of dementia is very suggestive it may be possible to bank people's blood so that future genetic advances might enable a better risk assessment.

Anyone who is concerned about their chance of developing dementia as they age should do what we all know is good for our brains: eat healthily, keep our weight, cholesterol and blood sugars in a healthy range, keep our blood pressure in a good range, stop smoking, drink alcohol in moderation if at all, don't use other street drugs, exercise regularly, keep socially active, and keep your brain active by trying new things!

Acknowledgements

- Living with dementia. April 2009. Alzheimer's Society UK
- 'Lewy Body Dementia'. Headlines, National newsletter of Neurological Foundation of NZ. Autumn 2009
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