as 15-20 years. In contrast, having the E2/E3 or E2/E2 combination may reduce your risk of Alzheimer's disease by up to 50%.

The evidence that lowering the level of cholesterol in the blood will reduce the risk of early-onset Alzheimer's disease is inconclusive but recent evidence suggest that flavonoid-rich plant derived foods such as teas, red wine (in moderation), berries, cocoa and citrus fruit may be effective in reducing age-related loss of memory and cognitive function, and this another of our research interests.

We will tell you the results of your genotype test only if you specifically ask us to do so. In view of the increased risk of heart disease and dementia associated with the E4 genotype, some people might find it distressing if they were to be given this information, and may prefer not to be told their results for this reason. If you were to be told that you have the E4/E4 genotype, we would recommend that you contact your GP to discuss the implications of this. At present there are no treatments available which will completely abolish your risk of developing heart disease or dementia in the long term. However, there is good evidence that dietary modification, stopping smoking and cholesterol-lowering statin drugs will reduce the risk of heart disease, and these measures are particularly important in high-risk individuals. Similar measures may be effective in reducing the risk of developing dementia but the evidence for this is not strong at present. However, this is an active research area, and it is likely that preventative measures will emerge in the near future, and it is clearly important that high-risk individuals take advantage of these.

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Genes contain the information to make all the proteins our body needs. Humans have around 25, 000 genes, 99.9% of which are exactly the same in all people. There is much interest in the genes that differ between people and the impact that these differences may have on our health and risk of disease. At the University of Reading, we are interested in how these variations affect people's response to foods. For this reason, in some of our studies we ask you to provide a blood sample that we use to determine whether you have variations of a particular gene.

Your blood sample will be tested for variations in COMT, and this factsheet is designed to explain what COMT does in the body and what impact variations in the COMT gene may have on your health.

The COMT gene provides instructions for making a protein which is involved in a variety of processes in the body, including the metabolism of certain brain chemical messengers, hormones, some medicinal products and food components such as those found in green tea, apples, red wine and chocolate.

The COMT genetic code can differ slightly from person to person. Changes in the COMT gene can alter either the amount of COMT produced, or can change its structure and function. One such change in the genetic code alters a single protein building block (amino acid) in the COMT protein at position 158, which causes the protein to work at a slightly slower rate.

Everybody inherits two COMT genes, one from each parent. Therefore, it is possible for you to have two genes coding for the fast working protein (termed GG), two genes coding for the slow working protein (termed AA) or one of each (termed AG). About 25% will have the GG version, another 25% will have the AA version and the remainder 50% will have a combination (AG). The combination of genes which you have is called your "genotype"

Research on the COMT gene is still in the early stages and the effects of the each version have not yet been proven. However, it appears that the AA genotype produces a COMT protein which is of lower activity, so that if you have the AA genotype

People with the GG genotype are thought to have slightly lower levels of dopamine. In a very small number of individuals, this may increase the risk of developing disorders which affect thoughts and emotions, such as eating disorders. However, the increase in risk is very small and many other factors, such as other genes and our lifestyles/experiences, play a much larger part in determining the risk of these complex disorders. This lower level of dopamine may also mean that people with the GG variant have a higher pain threshold, are less anxious and are more resistant to stress than people who are AA.

Individuals with one of each variant (AG) are likely to have an intermediate level of dopamine, and respond in a way that is in between those individuals who are either GG or AA.

The impact on brain function of having a COMT GG is likely to be relatively minor compared to many other factors. For example, abstinence from recreational drugs such as cannabis can decrease your risk of developing disorders which affect emotions and thoughts. A healthy balanced diet, avoiding alcohol, sugar and caffeine in excessive amounts, and increasing intakes of fruits, vegetables, nuts, seeds and oily fish may help to increase brain function. Physical exercise can also help to reduce feelings of anxiety and stress.

The genotyping we do is what is called ‘predictive testing’ and as such there is no need to disclose the results of these tests, at present or any time in the future, to your insurance company

Genes contain the information to make all the proteins our body needs. Humans have around 25, 000 genes, 99.9% of which are exactly the same in all people. There is much interest in the genes that differ between people and the impact that these differences may have on our health and risk of disease. At the University of Reading, we are interested in how these variations affect people's response to foods. For this reason, in some of our studies we ask you to provide a blood sample that we use to determine whether you have variations of a particular gene.

Your blood sample will be tested for variations in eNOS, and this factsheet is designed to explain what eNOS does in the body and what impact variations in the eNOS gene may have on your health.

The eNOS gene provides instructions for making a protein which produces nitric oxide, a substance which causes the dilation of blood vessels.

The eNOS genetic code can differ slightly from person to person. The most common change in the genetic code alters a single protein building block (amino acid) in the eNOS protein. Some studies have shown that this variation can change the activity of the protein, causing it to produce less nitric oxide under certain conditions.

Everybody inherits two eNOS genes, one from each parent. Therefore, it is possible for you to have two genes coding for the less active protein (termed AA), two genes coding for the more active protein (termed GG) or one of each (termed AG). About 1 in 10 people will have the AA version, 7 in 10 will have the GG version and 2 in 10 have a combination (AG). The AA version is much less common in Asian populations (1 in 200 people). The combination of genes which you have is called your "genotype"

If you have the less active AA genotype, it may mean your body produces less nitric oxide than people with the more active GG genotype. This may mean that the blood vessels of AA individuals may be slightly less flexible. There is evidence that having less flexible arteries may be associated with an increased risk of heart disease. Research on the eNOS gene is still in the very early stages, but some studies suggest that people with the AA eNOS genotype have a 30% increased risk of certain types of heart disease compared to people with the GG genotype. However, many other factors, such as other genes and our lifestyle play a much larger part in determining the risk of heart disease. For example, smoking is associated with a 200-300% increase in the risk of heart disease.

It is thought that individuals with the combination genotype (AG) have a risk of heart disease similar to those with the GG version.

# *FTO*

Genes contain the information to make all the proteins our body needs. Humans have around 25,000 genes, 99.9% of which are exactly the same in all people. There is much interest in the genes that differ between people and how they impact our health. At the University of Reading, we are interested in how these variations affect people's response to foods. For this reason, in some of our studies we ask you to provide a blood sample that we use to determine if you have variations of a particular gene.

Your blood sample will be tested for variations in the *fat mass and obesity associated* (*FTO)* gene, and this factsheet is designed to explain what

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the gene. Therefore, people with the RR version of the *LEPR* gene might have lower risk of becoming obese compared with people who carry one copy of Q.

However, the effects of each version of both the *LEP* and *LEPR* remain uncertain. Many other factors, such as environmental and socioeconomic conditions and our lifestyle play a much larger part in determining the risk of excess body weight. For example, a high dietary fat intake, energy rich drinks, and a low level of physical activity confer a much higher risk of developing obesity. Keeping physically active, eating less high-energy density food and increasing your intake of fibre, fruit and vegetables are also going to help reduce everyone's risk of excess body weight. The 'change4life'website, www.nhs.uk/Change4Life/Pages/default.aspx has lots of tips on how to look after your weight.

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We are interested to further determine if individuals of different *FTO* genotype respond differently to dietary change. In the future, rather than providing everyone with general dietary advice, it may be that a more personalised approach is taken, providing advice to suit an individual's genetic make-up

# *MC4R*

Genes contain the information to make all the proteins our body needs. Humans have around 25,000 genes, 99.9% of which are exactly the same in all people. There is much interest in the genes that differ between people and how they impact our health. At the University of Reading, we are interested in how these variations affect people's response to foods. For this reason, in some of our studies we ask you to provide a blood sample that we use to determine if you have variations of a particular gene.

Your blood sample will be tested for variations near the *melanocortin-4 receptor* (*MC4R*) gene, and this factsheet is designed to explain what *MC4R* do in the body and what impact variations in the codes next to *MC4R* gene may have on your health.

## *MC4R*

The *MC4R* gene provides instructions for making the *MC4R. MC4R* reduces food intake and stimulate energy expenditure and consequently is important in the regulation of body weight.

## *MC4R*

The *MC4R* genetic code can differ slightly from person to person. Changes in the *MC4R* gene can alter its function. One such change in the genetic code (rs17782313) next to the *MC4R*, results in a C or T version of the gene. Everybody inherits two *MC4R* genes, one from each parent. Therefore, it is possible for you to have two genes coding for the more active variant (termed TT), two genes for the less active variant (termed CC) or one of each (termed TC). The genotype distribution is about 6% for the CC version, 37% for the TC version and 57% for the TT version

If you have the less active CC version of the gene, it may mean that the gene may not process properly the information needed to create a functional protein, thus this inefficient protein may lead to excess body weight gain. Research on the *MC4R* gene is still in the very early stages, but some studies suggest that people with the CC version of the code next to *MC4R* weigh 1.5 kg more and have a higher percentage of body fat and an increased risk of obesity compared with people with the TT version. Individuals with the combination gene (AT) weigh on average 0.7 kg more compared with people with the TT version.

However, many other factors, such as environmental and socioeconomic conditions and our lifestyle play a much larger part in determining the risk of excess body weight. For example, a high dietary fat intake, energy rich drinks, and a low level of physical activity confer a much higher risk of developing obesity. Keeping physically active, eating less high-energy density food and increasing your intake of fibre, fruit and vegetables are also going to help reduce everyone's risk of excess body weight. The 'change4life'website, www.nhs.uk/Change4Life/Pages/default.aspx has lots of tips on how to look after your weight.

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We are interested to further determine if individuals of different *FTO* genotype respond differently to dietary change. In the future, rather than providing everyone with general dietary advice, it may be that a more personalised approach is taken, providing advice to suit an individual's genetic make-up

It must be emphasised that genotyping is a relatively new area which is still in the research stage, with information in this area far from complete. If you would like to read more on this topic, you may find the following web-site of the Human Genetics Commission useful, www.hgc.gov.uk