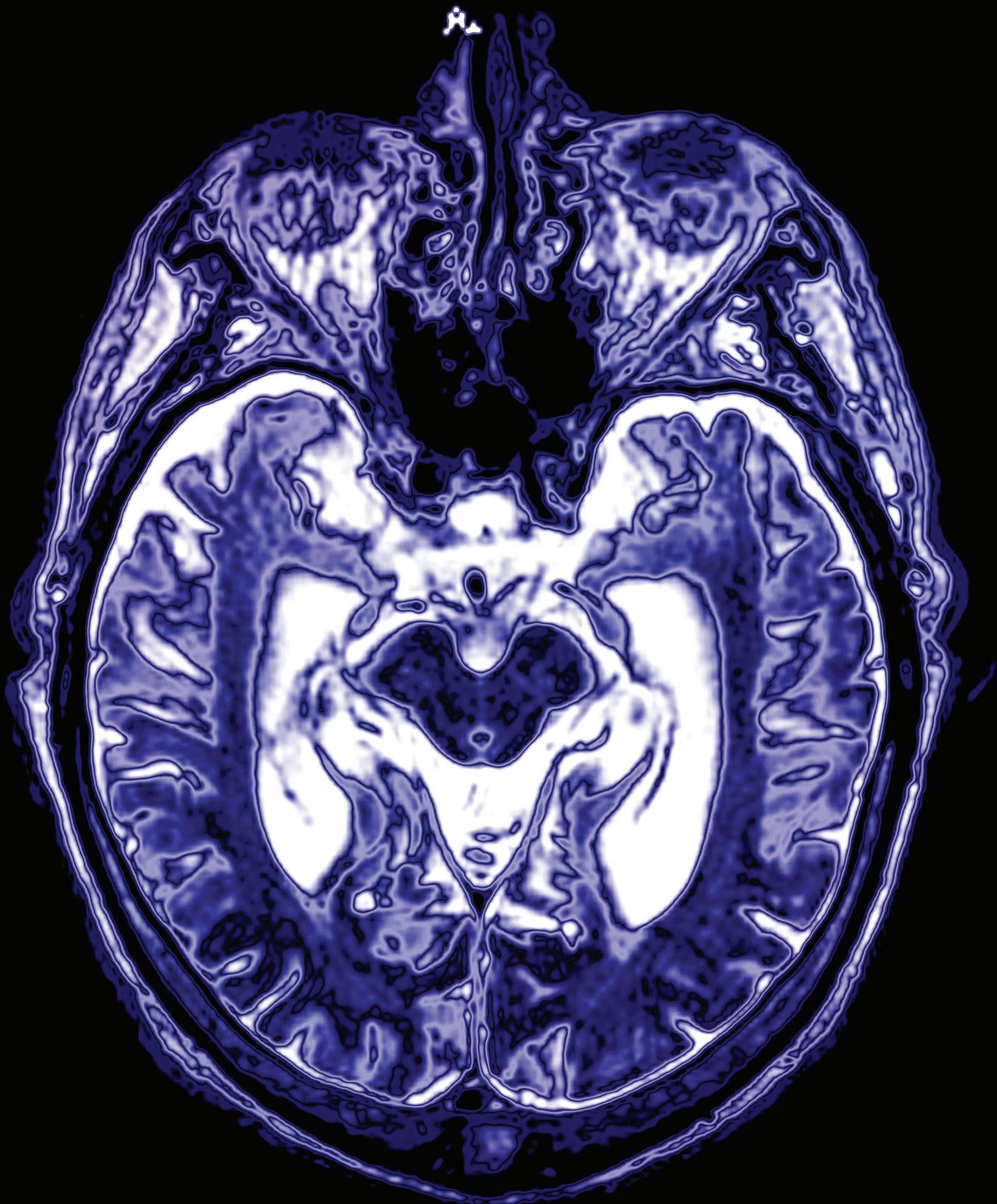


# Alzheimer's in the news

fear and fascination



A Behind the Headlines special report

# Contents

<b>Introduction</b>	<b>1</b>
The impact of Alzheimer's	2
Alzheimer's in the media	3
<b>Causes and risk factors</b>	<b>4</b>
Genes	5
Lifestyle	5
Other factors	7
<b>Prevention</b>	<b>7</b>
RCTS of dementia prevention	9
Tests and diagnosis	10
Memory tests	10
Brain scans	11
Blood tests	12
<b>Potential treatments</b>	<b>12</b>
Randomised controlled trials of treatments	13
Other RCTs of dementia treatments	14
<b>Tomorrow's headlines</b>	<b>14</b>
Gene research	14
Early diagnosis and detection	15
New drugs	16
A vaccine against Alzheimer's?	17
Find out more about dementia and Alzheimer's	17

## Introduction

Alzheimer's disease is a modern medical bogeyman, feared by many and never far from the headlines. If there is one health worry that seems to eclipse all others as people get older, it is falling prey to Alzheimer's or some other form of dementia. Research shows how deep this fear runs. A 2011 survey found that 31% of people feared dementia more than death or cancer. The study, by Alzheimer's Research UK, also found that fear of dementia didn't just affect older people.

Over half (52%) of UK adults aged 30 to 50 were afraid their parents would develop dementia, compared to 42% who feared they would get cancer and 33% a heart attack.<sup>1</sup>

This anxiety both fuels and is fed by a constant stream of stories in the press, charting the latest developments in understanding, treating or preventing the condition.

Since 2007, Behind the Headlines has covered over a hundred news stories on dementia, about two-thirds of which were related to Alzheimer's disease in some way.

This report looks at how the mainstream media has reported Alzheimer's disease over the last four years, and assesses which of the many headlines were justified and which were wide of the mark. It identifies key themes and common problems in the news reports and, hopefully, will help readers judge



for themselves the value of future news reports.

Finally, we asked leading experts to predict what will be making headlines in the months and years to come.

This report discusses the media coverage of research into dementia and Alzheimer's disease, examining some of the individual studies that have been reported, and the accuracy of those reports. This article is not a definitive guide to the disease or treatment. People wanting more information should visit the NHS Choices [Health A-Z page on Dementia](#).

# The impact of Alzheimer's

In the UK, it's estimated that over 750,000 people have some form of dementia, most of them over 65. Of these, nearly two-thirds – around 465,000 – have Alzheimer's.

The risk of dementia rises dramatically in old age. Currently, dementia affects about 10 in 1,000 people aged 65 to 69, about 40 in 1,000 people aged 70 to 79, and about 170 in 1,000 people aged 80 and above.

As our population ages rapidly, the number of people with Alzheimer's and other forms of dementia is set to grow apace. In the UK, the number of people with some form of dementia

is predicted to rise to just over 940,000 by 2021 and to 1.7 million by 2051.

However, these figures include only those people with dementia, while the burden of coping with the condition is shouldered by a much larger group.

As Simon Lovestone, professor of old age psychiatry at King's College London, says: "Alzheimer's disease is a terrible problem, both for people who suffer the condition and their families, who are the main carers. Sufferers of the disease lose a little bit about what it is to be themselves, while many families say it is a living bereavement."

Dementia also has a huge financial impact. The Alzheimer's Society estimates that the current

cost to the UK is £20 billion a year. In 2008, health think tank The King's Fund predicted that the cost of dementia in England alone would rise to £34.8 billion by 2026.

You can find out more about Alzheimer's disease and its [symptoms, diagnosis and treatment](#) on the NHS Choices website.

## What is dementia?

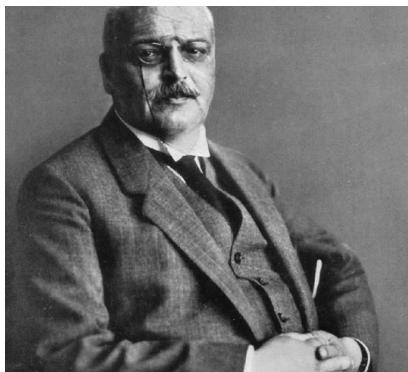
Dementia is not a disease in itself, but is the term used to describe a collection of symptoms that follow a loss or decline in someone's mental (cognitive) ability, caused by the death or poor functioning of brain cells. Types of dementia include Alzheimer's disease and vascular dementia and other rarer types such as dementia with Lewy bodies, and fronto-temporal dementia.

## What is Alzheimer's?

Alzheimer's disease is the most common type of dementia, accounting for nearly two thirds of cases. Alzheimer's is a physical disease of the brain, resulting in the death of brain cells. Alzheimer's is at the moment incurable and progressive. This means that over time, more parts of the brain become damaged and the symptoms become more severe.

The mental decline seen with age has been described throughout history, but it wasn't until 1906 that Dr Alois Alzheimer identified the [first published](#) case of the disease.

Dr Alzheimer was working at a mental asylum in Frankfurt in 1901, when he met a 51-year-old patient called Auguste Deter. Deter had many of the symptoms we now associate with Alzheimer's, including



Dr Alois Alzheimer was the first to document the disease

"reduced comprehension and memory, as well as aphasia [language problems], disorientation, unpredictable behaviour, paranoia, auditory hallucinations, and pronounced psychosocial impairment". Dr Alzheimer continued to follow Deter's case until she died five years later in 1906, at which time he asked to study her records and brain. His examinations revealed for the first time the clumps of proteins, known as plaques and tangles, in the brain that are a characteristic of the disease.

Dr Alzheimer's case notes for Deter were found in 1995, almost 90 years after her death, and the researchers who found them concluded that they fulfilled the same criteria for [diagnosing Alzheimer's](#) as we use today.



Ronald Reagan lived with Alzheimer's

## Alzheimer's in the media

Given this alarming picture and a growing number of high-profile people with Alzheimer's – including author Terry Pratchett and the late former US president Ronald Reagan – it's not surprising that dementia is big news.

A large amount of media coverage is devoted to new developments in our scientific understanding of Alzheimer's – what may cause it, what we can do to avoid it, new tests to spot early signs of the disease and potential new treatments.

However, as with all health science reporting, not everything you read in the papers is accurate or reliable.

This is where Behind the Headlines steps in, checking the evidence behind the news reports and providing a no-nonsense appraisal of each story's significance.

Since 2007, we have published appraisals of more than 2,000 studies and over 100 of these have focused on dementia and Alzheimer's. These same studies have been reported in around 300 news stories in mainstream daily newspapers and even more widely across the internet.

Table 1: Dementia reports as a proportion of all health stories covered by Behind the Headlines.

	Total number of stories covered by Behind the Headlines	Number of news stories on dementia and Alzheimer's covered in Behind the Headlines	Percentage of all stories which were about dementia
Telegraph	1,177	70	5.9
Mail	1,051	56	5.3
BBC	971	56	5.8
Express	442	17	3.8
Guardian	434	25	5.8
Independent	382	16	4.2
Times	361	18	5.0
Mirror	334	22	6.6
Sun	197	7	3.6

Table 1 shows what proportion of stories covered by Behind the Headlines from each news source were about dementia and Alzheimer's, from July 4 2007 to July 19 2011.

Table 1 shows what percentage of stories covered by Behind the Headlines from each news source were about dementia and Alzheimer's. For almost all newspapers, this accounts for at least one in every 20 stories covered – a significant proportion of their health news output.

Some simple analysis of these stories over the past four years provides an insight into the way the media reports on dementia and Alzheimer's.

Almost all the dementia stories we have covered fall into one of the following categories:

- Causes and risk factors
- Prevention

- Tests and diagnosis
- Potential new treatments

The chart shows how stories are divided among these categories. The stories are categorised according to the focus of the news reporting, and some fall into more than one category. The articles in the 'other' category include those on dementia care in hospitals, updates to NICE guidelines and research investigating the biology and anatomy of Alzheimer's.

This analysis suggests that newspapers focus mainly on ways of preventing dementia, such as lifestyle choices.

Chart showing the proportion of each type of dementia story covered in the press

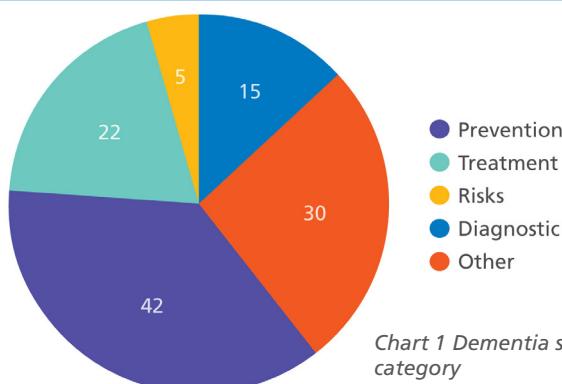
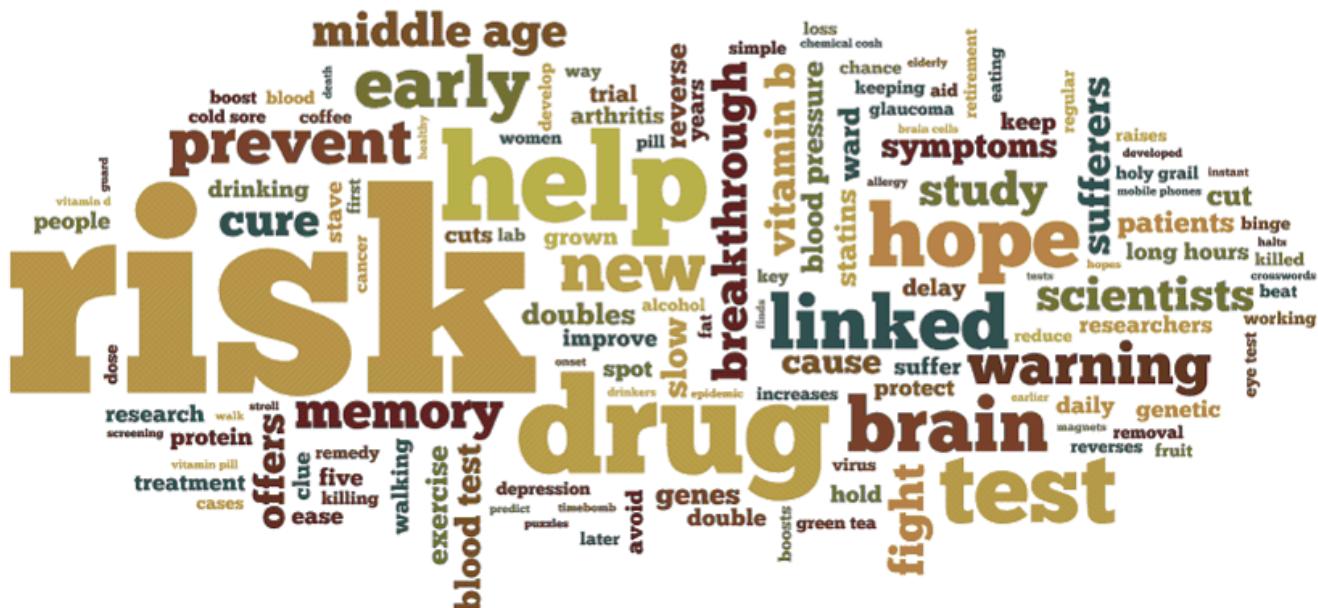


Chart 1 Dementia stories by category

Word cloud showing the most commonly used terms in news headlines on dementia and Alzheimer's disease



The word cloud, showing which terms are most commonly used in media headlines, illustrates how newspapers present this information, with 'risk', 'drug', 'test', 'help' and 'prevent' all prominent. Emotive words such as 'breakthrough', 'hope' and 'warning' are also common, but the appearance of 'early' among the most popular headline words may reflect the uncertainty over the impact of many of the findings being presented.

The following sections of this report look at each of the key categories listed above, highlighting what we do and don't know and illustrating some of the problems that arise in the media's reporting of this complex area of medicine.

## Causes and risk factors

Finding out what causes complex diseases such as Alzheimer's takes a lot of research. It usually requires the gradual build-up

of a body of different types of evidence. Therefore, if a news story announces that the causes of such diseases have been 'cracked' based on one piece of new research, it is generally overstating the facts.

Studies that investigate risk factors would ideally assess a large group of people without Alzheimer's to see which of them had been exposed to a possible risk factor. It would then follow them up over time to see who develops the disease and if the risk of getting Alzheimer's differs in people with different exposures. This is known as a prospective cohort study. With Alzheimer's disease, it may be necessary to follow people for a long time, which makes such studies expensive.

Alternatively, studies may compare people with and without Alzheimer's disease to see how exposure to a possible risk factor in the past differs between the two groups. This is known as a case-control study. Genetic studies

tend to use this approach. For non-genetic risk factors, this type of study may not be able to ensure that the participants remember their past exposures accurately, or that exposure to risk factors occurred before Alzheimer's developed.

If one study finds a link between an exposure and an outcome such as Alzheimer's disease, this needs to be confirmed by findings from similar studies and other types of evidence before we can say that the exposure is likely to have caused the outcome.

Sometimes, newspapers report new risks for Alzheimer's based only on animal or laboratory studies. Without confirming the results of these studies in people, it is not possible to conclude that the factors they identified definitely increase the risk of Alzheimer's. For example, in 2007, many newspapers reported that getting cold sores increases Alzheimer's risk.

While this may be an interesting

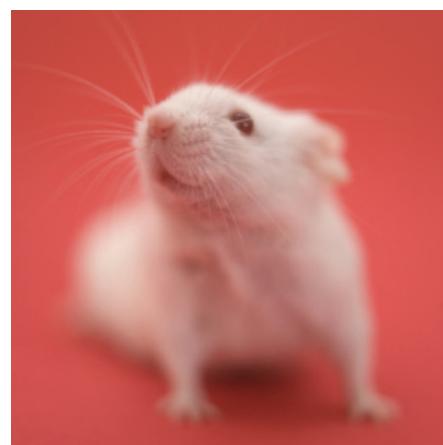
theory, it was based on a study in mice that were given the herpes simplex virus, which causes cold sores. It found that large quantities of amyloid protein built up in the mice's brains, which is similar to what happens in the brains of people with Alzheimer's. However, as yet there isn't any convincing evidence that the cold sore virus causes Alzheimer's in humans.

The media has covered numerous studies into both known and suspected risk factors. What follows is a selection of the stories that we have responded to over the past four years.

## Genes

While studies such as the cold sore study above need much more research to establish their importance, others have been more robust. Advances in our understanding of the genetic factors that contribute to Alzheimer's disease have grabbed the headlines recently.

In April 2011, many newspapers reported that five new genetic variants associated with the disease had been identified. This brought the number of



Claims for human health based on animal research should be treated with caution

variants linked with late-onset Alzheimer's to 10. The latest genetic links were identified in two studies, known as genome-wide association studies, which looked for differences in the genetic profile of people with Alzheimer's disease compared to people without the condition. The findings were major news, and the researchers reported that together these 10 variants appear to count for much of the [genetic risk of Alzheimer's](#). At the time, one of the researchers involved in this discovery told the BBC: "If the effects of all 10 [variants] could be eliminated the risk of developing the disease could be cut by 60%."

Generally, this research received high-profile coverage, and the media gave helpful explanations of what is very complex science. However, the newspapers could have emphasised the fact that a practical application for these findings is likely to be at least 10 to 15 years away.

## Lifestyle

The media regularly reports that certain behaviour might increase the risk of dementia. Potentially modifiable 'lifestyle' risks reported in the news stories that we assessed include: heavy smoking, passive smoking, having a pot belly in middle age, being obese, having an 'apple' body shape, high body fat, obesity in mid-life, omega-6 fatty acids, binge drinking, alcohol abuse and working long hours.

Not all the research covered by Behind the Headlines is as significant as the genetics studies. Some studies, such as those that looked at [omega-6 fatty acids](#) and long [working hours](#), were



Vegetable oils are a source of omega-6 early-stage research that need more study.

Other studies have had results that, on their own, may not present particularly strong evidence, but which confirm what has been found in other research. This adds to the evidence for dementia risks, and increases our knowledge of how modifiable lifestyle factors, such as smoking, obesity and excessive alcohol consumption, affect our risk.

## Smoking

In October 2010, *The Independent* reported that a large study of 21,000 middle-aged men found that those who smoked more than two packs of cigarettes a day were more than twice as likely to develop Alzheimer's as people who had never smoked. We found that while the study had some strengths, it also had limitations and ideally its findings should be confirmed in other studies. The National Institute for Health and Clinical Excellence (NICE) lists [smoking as a risk factor for both Alzheimer's disease](#) and another type of dementia called vascular dementia (where problems with blood circulation mean that

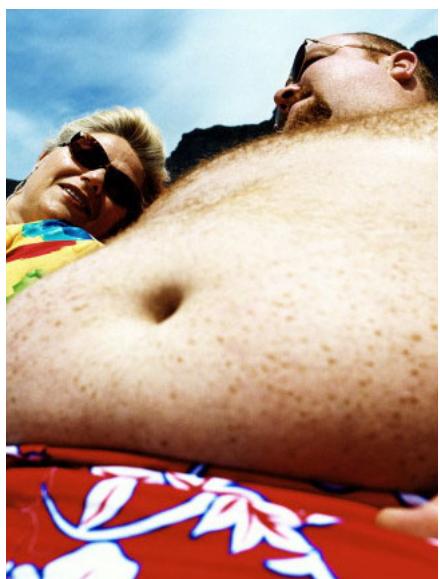


NICE advises that smoking can increase the risk of developing Alzheimer's

parts of the brain do not receive enough blood and oxygen).

## Obesity

Obesity is another factor that is thought to potentially increase the risk of Alzheimer's. The *Daily Express* reported in May 2008 that a review of studies supported a possible link between obesity and Alzheimer's risk. It also found an [increased risk of dementia in people who were underweight](#).



Obesity may increase risk of Alzheimer's

We concluded that further research was needed to clearly establish a link between weight and dementia.

## Alcohol

In November 2008, the *Daily Mail* warned: "Binge drinkers are putting themselves at risk of Alzheimer's in later life." It said there could be an "epidemic" in the number of people with alcohol-related dementia in the near future.

We said that the news story largely reflected the editorial in the British Journal of Psychiatry on



Binge drinking may increase your risk

which it was based. This editorial stated that alcohol-related dementia is under-recognised and may account for up to 10% of all dementia cases – around 70,000 people in the UK. However, the editorial was about [alcohol-related dementia](#), which is not the same as Alzheimer's, as the *Mail* and *Daily Mirror* both suggested.

## Depression

Since 2007, several news stories have reported the link between depression and Alzheimer's.

A 17-year study, covered by the BBC in July 2010, confirmed that the two are linked when it found [elderly people with depression had almost double the risk of developing dementia](#) later in life.

However, as we reported at the time: "This does not necessarily mean that depression causes dementia and the reason for the association between the two conditions is still unclear. It is unknown if depression is a risk factor for dementia, whether it is an early sign of cognitive decline or if certain changes in the brain are associated with both conditions."

Two years earlier, *The Daily Telegraph* covered a study that tried to shed some light on the relationship between depression and Alzheimer's. This research followed more than 900 members of the Catholic clergy for up to 13 years. It found that, although people who developed Alzheimer's had more symptoms of depression when the study began, these symptoms did not increase in the time leading up to the onset of Alzheimer's symptoms, nor after the symptoms developed. The researchers took this to mean that depression is not an early sign of the same processes that cause dementia. If it was, the symptoms of depression might be expected to get worse as the Alzheimer's symptoms progressed. The researchers suggested that depressive symptoms may be a risk factor for Alzheimer's.

We didn't completely agree with this conclusion, however, as the study had several limitations that clouded the relationship. We advised that, until further research provided a clearer picture, people with [depression](#) should not be overly concerned about being at greater risk of developing dementia.

There is an established link between depression and dementia, but the relationship is complex. Depression may be a risk factor for dementia. However, not only do the symptoms of depression resemble those of dementia, but the two conditions can also occur at the same time. While depression could be an early sign of the brain changes that eventually lead to Alzheimer's, some studies, such as the one described above, suggest that this may not be the case.

In its guideline on dementia, NICE notes that no prospective studies have examined whether reducing depression subsequently reduces dementia risk.



*There is no convincing evidence that aluminium raises risk*

## Other factors

Other studies have looked at other diseases or conditions that may increase Alzheimer's risk. For instance, *The Guardian* covered a study in August 2007 that looked at [whether a woman having her ovaries removed increased her risk of dementia in old age](#). We found that, although the risk of dementia was almost 50% higher in women who had their ovaries removed at a relatively young age, the total number of women who

developed dementia in the study was low (268 women out of 3,000).

## Environmental factors

It has been suggested that several environmental factors may contribute to the risk of Alzheimer's. However, none of these has been conclusively proven to have an effect. For example, in the past, scientists noticed that some people with Alzheimer's disease had aluminium in the clumps of proteins – called plaques and tangles – in their brains when they died. However, [it's not possible to say that the aluminium caused Alzheimer's](#) as the accumulation of aluminium may have occurred as a result of the disease. The current medical and scientific consensus is that there is no convincing evidence that aluminium causes Alzheimer's disease.

NICE says that while it is clear that consuming aluminium can have a toxic effect on nerve cells, it is unclear whether it is responsible for the deterioration of brain cells in Alzheimer's disease.

Several studies on possible environmental risk factors have made the news in recent years. However, none of the ones we analysed provided clear evidence that these factors have a role in causing Alzheimer's.

## Copper pipes

In January 2010, *the Telegraph* reported that a [review of research on copper pipes](#) found that they could cause heart disease and Alzheimer's. We found that this review only looked at a small

sample of studies, and most of the evidence it presented was based on studies in animals and cells. None of the studies directly assessed whether water from copper pipes contributes to Alzheimer's disease.



*The review we covered mainly presented studies on copper in animals*

## Pesticides

Meanwhile, a study in December 2010, which was reported in *The Independent*, appeared to show an association between [long-term exposure to pesticides and a slightly greater risk of decline](#) in mental ability in 1,000 French vineyard workers. Behind the Headlines concluded that while the increased exposure of farm workers to pesticides is an important issue, the study did not show that pesticides cause Alzheimer's.



*The study we covered did not assess the effect of pesticides on risk of dementia*

## Prevention

Another favourite media topic is how to reduce the chances of getting Alzheimer's and dementia. It's an important issue, but study findings are

often wildly overstated by the newspapers. The problem is that many news stories on how to prevent Alzheimer's are based on observational studies, which have identified an association between a particular factor and a reduced risk of Alzheimer's. Other news stories are based on animal or laboratory studies, or on short-term studies that look at substitute measures, such as poor performance on memory tests or brain shrinkage, neither of which is the same as having Alzheimer's.

A randomised controlled trial (RCT) would be necessary to show whether an intervention can truly prevent Alzheimer's. Studies of this type randomly split participants into two groups – a group that receives a drug or intervention, and a 'control' group that receives an existing preventative measure, an inactive placebo or no intervention at all.

Randomly allocating people into groups in an RCT means that the groups should be very similar to each other. This means that any differences in outcome are likely to be directly due to differences in the interventions the participants receive.

However, because Alzheimer's usually develops late in life, and the disease process is believed to start 10 to 20 years before symptoms arise, such a trial might need to be decades long to show an effect. Therefore, trials often use intermediate measures, such as brain shrinkage or mental ability, rather than looking at Alzheimer's itself.

Several interventions have been studied or suggested as possible ways of reducing the risk of

## What are the known risks for dementia and Alzheimer's?

In their 2007 guideline on dementia, the National Institute for Health and Clinical Excellence (NICE) and Social Care Institute for Excellence (SCIE) mention the following risk factors for dementia and Alzheimer's.

They say that established non-modifiable risk factors for dementia in general and Alzheimer's disease in particular include being older, your genetic make-up, being female and having a learning disability.

Established risk factors that may be modifiable include high blood pressure, excessive alcohol consumption, diabetes, depression and head injury.

Other potentially modifiable risk factors may include obesity, raised levels of an amino acid called homocysteine in the blood and raised cholesterol levels.

Risk factors for vascular dementia overlap with Alzheimer's disease and include age, vascular risk factors (stroke, high blood pressure, diabetes and smoking) and carrying the E4 form of the ApoE gene.

## Is there anything I can do to reduce my risk of Alzheimer's?

Studies have not yet conclusively identified any interventions that can reduce our risk of Alzheimer's. In the absence of this type of evidence, the best advice that can currently

be offered is based on what we know about the possible modifiable risk factors for Alzheimer's. That largely means following a healthy lifestyle, ideally not just in old age.



*Staying active is important*

According to the National Institute for Health and Clinical Excellence (NICE), factors that may help protect against dementia include long-term use of non-steroidal anti-inflammatory drugs (NSAIDs), control of vascular risk factors, regular exercise, and doing activities that stimulate the brain.

However, so far, studies have not clearly shown that adopting any of these changes leads to a reduction in dementia rates. For example, four trials of therapy to treat high blood pressure showed a non-significant trend towards reduced dementia rates in people who received the treatment, two trials of statins (cholesterol-lowering drugs) found no effect, and one study of hormone replacement therapy unexpectedly found increased dementia rates in people who received treatment.

Due to the lack of convincing evidence that specific drugs can reduce the risk of developing dementia, NICE recommends that the following should not be used to reduce dementia risk: statins, hormone replacement therapy, vitamin E or NSAIDs.

dementia, based on what is known about the disease and possible modifiable risk factors. In their guidelines from 2007, NICE noted that the evidence for preventing dementia was largely restricted to types of study (called [observational studies](#)) that offer much less robust evidence than RCTs. The available RCT evidence on prevention at that time had either found no significant effect (as was the case with statins and high blood pressure drugs), or an increased risk of dementia with treatment (for example, with hormone replacement therapy).

Based on this, NICE recommended against the use of statins, hormone replacement therapy, vitamin E or non-steroidal anti-inflammatory drugs specifically for the prevention of dementia.

Keeping your brain active has also been suggested as a way to prevent Alzheimer's. NICE guidelines say that further studies are needed to assess whether keeping the brain active can protect against Alzheimer's.

## RCTs of dementia prevention

Behind the Headlines has covered several RCTs that looked at the prevention of dementia (though not necessarily Alzheimer's specifically).

### Ginkgo biloba

The most relevant RCT on the prevention of dementia that we covered assessed use of the herbal supplement ginkgo biloba in 3,000 elderly people over six years. This well-conducted study found that ginkgo biloba had no effect on the risk of dementia.



*The leaf of the ginkgo biloba tree*

The other RCTs into preventing dementia that we covered either looked at substitute outcomes (rather than dementia itself), or had other limitations which meant we could not draw firm conclusions about the effects of their interventions on Alzheimer's disease.

### Vitamin B

Vitamin B is a recurring focus of Alzheimer's research and has been studied in both the prevention and treatment of the disease. This may be partly because vitamin B deficiency can cause symptoms similar to those of dementia. In September 2010, the *Telegraph* reported that participants in an RCT, who had mild mental impairment, were given either vitamin B supplements (containing folic acid and vitamins B12 and B6) or a placebo for two years. People with mild cognitive impairment who took [vitamin B](#) showed less brain shrinkage than people who took the placebo.



*It is important to get aerobic exercise but whether it helps dementia is unproven*

However, brain shrinkage does not guarantee that a person will develop Alzheimer's, and some brain shrinkage is a normal part of ageing in people who do not develop the disease. Therefore, it is not possible to say conclusively whether the people who took vitamin B were less likely to develop Alzheimer's. More information on the study of vitamin B and treatment of dementia can be found later in this report.

### Exercise

A study in February 2011 was picked up by the *Express*. This research found that the volume of a part of the brain called the [hippocampus increased by 2% in older adults who did aerobic walking](#), while the same area decreased in volume by 1.4% in a control group who did mild stretching exercises. Despite the *Express'* headline, this study alone could not tell us that aerobic walking can "help beat dementia".

### Blood pressure drugs

An RCT reported in the *Mail* in February 2009 tested a new blood pressure medication (called indapine) against a placebo. After they assessed the effect of the drug on blood pressure, the researchers looked at whether the drug would cut the risk of dementia in very elderly people. The trial found no difference in the risk of dementia between the drug and the placebo. However, when the researchers pooled their results with those of other similar studies of high blood pressure treatments, they found that these drugs offered a modest reduction in the risk of dementia.

As this study did not specifically look at Alzheimer's, we cannot be sure what the effect on this type of dementia would be. Also, the study was set up to assess blood pressure and did not primarily look at dementia. In addition, it is not clear whether the researchers identified all the relevant studies to include in their pooled analysis. Therefore, these results should be interpreted very cautiously.

Several non-RCT studies have also claimed to identify interventions that can protect against Alzheimer's. Many of these have not even reached testing in humans, and are still at the stage of cell or animal research. These studies should be considered as very preliminary and not as conclusive evidence that the interventions have an effect. They should certainly not be seen as definitely forming the basis of a new prevention or treatment, as newspaper reports often suggest.

## Tests and diagnosis

Currently, there is no way to test people for Alzheimer's before the symptoms appear, even though the processes behind the disease start some time before these symptoms become apparent. This means that by the time someone is diagnosed, the disease process



Earlier diagnosis would allow care to be given earlier

is likely to be quite advanced and their brain will have already been subject to significant changes.

Developing new diagnostic techniques, particularly those that allow earlier diagnosis, is a key area of Alzheimer's research. Earlier diagnosis would allow us to use existing treatments at an earlier stage. However, the available treatments cannot reverse existing damage or stop the disease from progressing altogether. The hope is that, if we can identify the disease earlier in its development, this will help us study and develop new treatments to halt the progression of Alzheimer's disease before the damage it causes is advanced.

Most diagnostic techniques currently being developed concentrate on three different aspects of Alzheimer's disease:

- changes in a person's memory and mental functioning
- physical and structural changes in the brain
- changes in the chemical balance in the body and blood

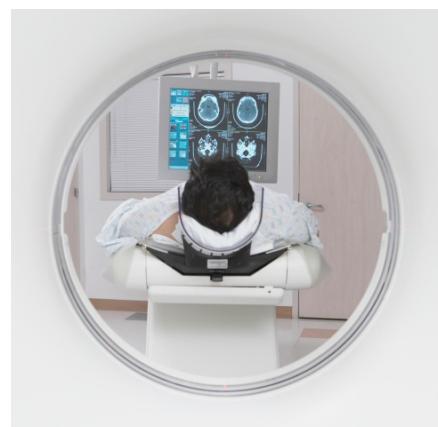
Some studies that made it into the papers were well designed and may eventually lead to improved detection of Alzheimer's. However, sometimes newspapers give too much significance to findings from very preliminary research.

## Memory tests

Tests of memory and mental functioning are already used to diagnose Alzheimer's disease and dementia. For example, one of the most widely used tests is the mini-mental state exam (MMSE), a validated testing technique that is recognised by NICE and numerous

medical bodies around the world. Research into honing existing tests as well as developing new ones is ongoing.

For example, some studies have looked at developing tests to help identify people who might need further assessment to determine if they have dementia. One such test is the self-administered Test Your Memory (TYM) method, which Behind the Headlines looked at in June 2009. *The Independent* said that the test,



Brain scans identify changes in the brain

which featured simple tasks such as drawing the time on a clock, could detect 93% of Alzheimer's cases. The news was based on a trial that compared TYM with the MMSE in 139 people with Alzheimer's disease or other types of dementia, as well as 540 people without dementia.

The trial found that the new assessment was more accurate than the MMSE alone for identifying people with Alzheimer's. However, the test wrongly identified a relatively high proportion of healthy participants as having dementia. We concluded that the test had potential, but that it needed

to be assessed in further trials, for example to verify the exact score that would be considered as indicating potential dementia. In addition, people with more severe cognition problems might struggle to carry out the test themselves, although this is unlikely to be a major issue if the test was to be used as a screening tool to identify Alzheimer's that has not yet been detected, which would probably be at an early stage.

Overall, if future studies are favourable, this test could potentially be used by non-specialist doctors as an initial screening tool for Alzheimer's. As with current methods, suspected cases of Alzheimer's would still need to be followed up with further testing and assessment by specialists to make a firm diagnosis.

[The Test Your Memory test](#) is available to view online (PDF 4kb).

## Brain scans

Brain scans are harder to carry out than memory tests, but they can help identify important changes in the structure of the brain, such as shrinking (atrophy), as well as areas with reduced functioning or unusual patterns of blood flow. Although no tests are available to make a definite diagnosis of Alzheimer's disease in living patients, these scans can help rule out conditions such as stroke or tumours that produce similar symptoms to Alzheimer's. It is only after ruling out conditions such as these that doctors will diagnose Alzheimer's disease.

As scanning technology continues

to develop and improve, scientists are researching new ways to detect the earliest brain changes in Alzheimer's disease.

In April 2011, the *Daily Mail* announced a technique that "could help detect changes leading to Alzheimer's disease up to a decade before the symptoms develop". The study behind this news story involved the development of a method based on using MRI (magnetic resonance imaging) scans to examine the thickness of nine different brain regions, dubbed "Alzheimer's signature areas" by researchers. The study followed 65 people without Alzheimer's disease with an average age of about 70. Researchers used scans to identify the dimensions of the volunteers' signature brain areas and followed them for up to 11 years to see which of them developed the disease. They found that 55% of volunteers whose brains were thinner in these nine areas developed Alzheimer's, compared to 20% of those with signature areas of average thickness and none of those with the thickest signature areas.

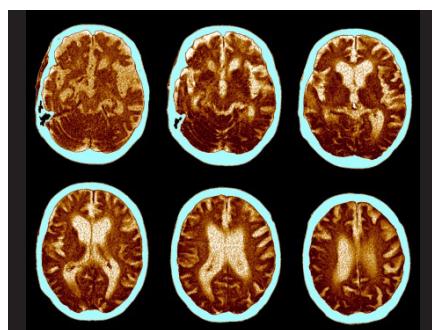
Although these results suggest [a link between the thickness of these brain regions and later risk of Alzheimer's](#), this was a preliminary study in a relatively

small number of people. Having greater numbers of participants generally increases the reliability of studies as it reduces the chance of anomalies distorting the results. However, the study's design – which involved testing people before they were known to develop Alzheimer's and following them up over several years to see who developed the disease, using accepted criteria for diagnosis – is the best way to tell whether a new test might be a good early detection method.

Repeating the study in larger numbers of participants should give a clearer indication of whether Alzheimer's signature areas can help predict who is at risk of developing the disease in the next decade.

While this research looked at the risk of developing Alzheimer's in elderly people, some newspaper reports suggested that brain scans can be used to predict whether someone would get the disease decades before symptoms would typically appear. For example, in November 2010, a story in the *Daily Mail* announced "an instant test at 40 to predict Alzheimer's."

The story, which said that a "30 second test" to screen for Alzheimer's could be available in as little as two years, was unfortunately overly optimistic. The research looked at how the presence of brain lesions was linked to a person's current mental function. It examined 428 healthy people in their 40s who did not have dementia and found that changes in the extent of one type of change in the white matter of the brain were linked to poorer performances in mental ability tests.



Brain scans showing white matter lesions

However, as the study did not follow the people up to see whether they developed Alzheimer's, we cannot be sure that brain scans looking at white matter lesions can predict who develops Alzheimer's. In fact, while the *Mail* suggested this research could lead to a test in two years, it will probably take several decades to tell which of the participants, if any, develop Alzheimer's disease. [The research should be seen as providing clues to the disease, rather than a new diagnosis method.](#)



*It is hoped that blood tests might one day detect early stage Alzheimer's*

## Blood tests

Blood tests are not currently used to detect Alzheimer's, although they may be used to help rule out other potential causes of memory loss.

Research into the possible use of [blood tests](#) to help detect Alzheimer's is at a very early stage, and there is still some way to go before we know if such tests could have a role in detecting Alzheimer's. Several news stories have covered these early studies.

In July 2011, the Telegraph reported that a blood test may soon be able to "predict Alzheimer's disease up to 10 years before symptoms appear".

The report was based on a study

that examined a range of proteins in the blood to see whether people who develop Alzheimer's have different levels of these proteins compared to people without the disease. The study found that the levels of a protein called clusterin was linked to mental decline, the severity of disease in people with Alzheimer's and the rate at which Alzheimer's progressed.

However, the researchers were looking at proteins in an experimental way and did not suggest that this protein may be used to diagnose Alzheimer's, at least not yet. In fact, they said that their findings did not support using clusterin levels alone to predict Alzheimer's disease.

## Potential treatments

Unfortunately, current treatments for Alzheimer's disease only temporarily slow the decline of brain function or deal with certain symptoms of the disease. They cannot stop the disease from progressing altogether, or reverse the damage that has already been done to the brain.

Studies looking at potential 'cures' for Alzheimer's – be they coffee, magnet therapy or even an Alzheimer's 'milkshake' – are frequently talked up by the media. It's often ignored that while the results of some of these trials look promising, developing safe and effective new drugs for any disease is a slow and painstaking process that requires several stages of research and can take many years.

A large proportion of the studies of potential treatments reported in the papers are preliminary



*Can "special milkshakes" slow Alzheimer's?*

studies, often carried out in cells in the laboratory or in animals. Any treatment for humans that might be developed from these studies remains many years away. However, this doesn't discourage headlines writers, who admittedly might have trouble fitting in this caveat while keeping the readers' interest. Many headlines about these studies have exaggerated their significance, often referring to them as a 'holy grail', 'fresh hope' or 'cure' for dementia.



*Results from lab studies are often just the first step in a lengthy research process*

For example, in November 2010, BBC News reported that the [diabetes drug metformin might offer "Alzheimer's hope"](#). This early-stage study on mouse cells found that metformin increased the activity of an enzyme that can counteract the development of tau protein tangles, which are characteristic of the disease. As metformin is already used in diabetes, it

could potentially reach the stage of human testing for Alzheimers' disease more quickly than a new drug. However, more laboratory and animal research would probably be needed before the start of testing in people with Alzheimer's.

Early studies like these are essential first steps in identifying drugs that could eventually be used in treating Alzheimer's disease in humans. However, they need to be seen as preliminary. Many of the drugs in these early studies do not prove to be effective or safe enough for human testing. For those that do, it can still take many years before we know if the drug works and is safe.

## Randomised controlled trials of treatments

The best way to investigate the effects of a treatment is with a randomised controlled trial (RCT). Of the 100 or so studies on Alzheimer's and dementia that we have covered over the past four years, just under a third looked at current or potential treatments. Of these, only six were RCTs that looked at the effects of treatments for Alzheimer's or dementia in humans.

These RCTs looked at the use of the herbal supplement ginkgo biloba, vitamin B, a multinutrient milkshake, a type of magnetic therapy and two drug treatments.

### Ginkgo biloba

The studies that tested ginkgo biloba and vitamin B in humans suggested that they do not help people with dementia.

In June 2008, BBC News reported that "[Ginkgo 'does not treat dementia'](#)".

The RCT behind this story compared the effects of ginkgo biloba extract in 176 people with mild to moderate dementia. It found that ginkgo did not improve mental performance compared to placebo over six months. We concluded that the study was well conducted and provided good evidence that ginkgo does not improve brain function or quality of life in people with mild to moderate dementia. The findings of this study are supported by a review of the evidence, published by the Cochrane Collaboration the following year, which concluded that there was no convincing evidence that ginkgo biloba is effective for dementia and mental impairment in general.

### B vitamins

B vitamins are a recurring story in the treatment and prevention of dementia. They are also a good example of how something can be reported to be helpful one month and useless the next. People are clearly interested in the subject, as some of Behind the Headlines' most popular articles are on B vitamins. *The Times* reported in 2008 that Alzheimer's patients were "wasting their time" taking vitamin B supplements in their attempts to slow the progress of the disease.

The RCT behind this story looked at the effects of a daily high-dose [vitamin B supplement](#) (containing folic acid and vitamins B6 and B12) over 18 months in 409 people with mild to moderate probable Alzheimer's disease. It found that



NICE says that vitamin B supplements offer no clear overall benefit in dementia

the vitamin B supplement did not slow mental decline any more than a placebo did.

Vitamin B was back in the news in September 2010, when the

## What does NICE say about vitamin B?

In its 2007 guidance on dementia, NICE concluded that there was insufficient evidence from RCTs to determine whether vitamin B12 has benefits that outweighed the risk of adverse effects in people with dementia. It also concluded that the increased risk of adverse effects with folic acid supplementation outweighed any potential benefits in people with dementia.

*Telegraph* reported: "Vitamin B tablets could slow and even halt the devastating march of Alzheimer's disease." The study in question was a well-conducted trial in 271 elderly people who did not have dementia but who did have mild memory problems. The study found that those who were given vitamin B experienced brain shrinkage (atrophy) 30% slower than those given inactive tablets.

Despite being promising, the results could not show that vitamin B can prevent dementia because the study cannot tell us

whether [this reduction in brain shrinkage](#) would have benefits for people with dementia.

## Other RCTs of dementia treatments

The other RCTs we covered that assessed potential Alzheimer's treatments had more promising initial results. However, these studies also had some limitations, such as their small size or not being fully published at the time they were reported.

### Rember trials

The *Daily Mail* reported in 2008 that the findings from [an early human trial of a drug called methylthioninium chloride](#) (Rember) was "the biggest breakthrough against brain disease for 100 years". The drug reportedly targeted the tau protein – which forms the characteristic tangles in brains of people with Alzheimer's disease – and reduced mental decline by 81% over a year in people with mild to moderate Alzheimer's. However, the findings had only been presented at a conference. While they may look encouraging, results presented at conferences should be interpreted with caution until they have been fully published in a peer-reviewed journal. Without being able to look at the study's methods or results in detail, it is difficult to draw firm conclusions about these findings.

### The anti-Alzheimer's milkshake

The story of a milkshake that could treat Alzheimer's, reported by the *Daily Mail* in 2010, is not as

unlikely as it sounds. However, the research on which it was based is still at an early stage and the findings were exaggerated by the newspaper, which said that the "once-a-day miracle drink" could be available within two years.

The RCT compared a daily [multinutrient milkshake](#) (containing 'phosphatide precursors and cofactors') with a placebo drink in 225 people with mild Alzheimer's over 12 weeks. The milkshake was found to improve participants' verbal recall more than the placebo drink, but did not have the same effect on other mental functions.

### Hayfever pill

In 2008, *The Sun* reported that [a hayfever pill called dimebon can "combat memory loss in patients with the brain disease"](#) An RCT looked at 183 Russian patients with mild to moderate Alzheimer's and found that dimebon improved symptoms compared to a placebo over 26 weeks. Although the study was small and limited to one country, it highlights that dimebon may have potential in treating Alzheimer's. However, this was early research and further studies are required.

### Magnet therapy

*The Independent* reported in 2010 that: "Applying magnets to the brains of Alzheimer's disease sufferers helps them understand what is said to them." This very small RCT assessed the effects of repetitive transcranial magnetic stimulation (rTMS) in 10 people with moderately severe Alzheimer's disease. Participants' performance improved in a



*Hayfever medication*

sentence comprehension test after two weeks of rTMS but not after a sham treatment. However, [this trial was too small and short to tell us whether any important long-term benefits](#) can be expected with this treatment. You can find out what treatments are currently available on the [NHS for dementia](#) in NHS Choices Health A-Z.

## Tomorrow's headlines

Trials of treatments that make the news, such as Rember and dimebon, are only one area of research.

Over the past few years, scientists have made some key advances, notably in the field of genetics, in progress towards earlier diagnosis and in developing drugs that may one day prevent Alzheimer's from progressing. We asked researchers in the field what areas of Alzheimer's research they expect to hit the headlines in the future.

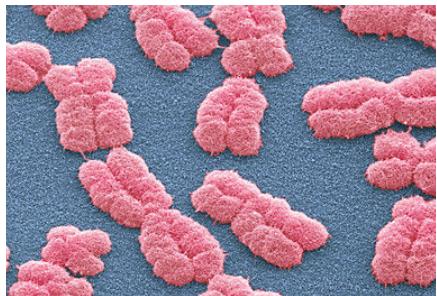
### Gene research

Nine of the 10 genetic variants associated with late-onset Alzheimer's have been discovered in the last two years. [Research that uncovered the last five](#) was published in 2011 in the journal

Nature Genetics and was covered in Behind the Headlines.

Professor Julie Williams of the department of psychological medicine and neurology at Cardiff University, and chair of the scientific advisory board at Alzheimer's Research UK, sees this as an exciting breakthrough.

"The more genes we can identify that increase risk of the disease, the more we understand what is going wrong biologically in the brain," says Professor Williams. "Eventually that will lead to new treatments."



*Our genes appear to play an important role in development of dementia*

What is very exciting, she says, is that the identified genes are clustering in patterns, which point to possible disease pathways that in future could be targeted for treatment. For example, several genes suggest that the immune or inflammatory response of people who develop Alzheimer's is somehow different from normal. Other genes that have been identified are involved with how we process fatty substances such as cholesterol, which indicates that this process may differ in people with Alzheimer's. "The brain makes its own cholesterol and there seems to be a problem with the way people with Alzheimer's process this," says Professor Williams.

The most recent and exciting breakthrough concerns a process called endocytosis. This is basically how a brain cell brings in 'big molecules' from outside and how they are processed. "We now have several genes that suggest that problems with this process are playing a strong role in the development of Alzheimer's disease."

The findings suggest that scientists are beginning to piece together the jigsaw of how and why the disease develops.

"If we were able to develop treatments to remove the detrimental effects of these gene variations, we should be able to reduce the numbers of people developing Alzheimer's disease in the long term," says Professor Williams.

How these more recently discovered factors relate to the plaques and tangles found in the brains of people with Alzheimer's is not yet known. However, it is possible, she says, that the plaques could be side effects of a more fundamental disease process.

"I'm excited by these findings and I know that eventually they will make a difference. We have lots of questions still to answer about genetics and we know they can result in potential therapies," says Professor Williams.

## Early diagnosis and detection

Early detection of Alzheimer's disease, years before symptoms first appear, is crucial if new drugs are to stop the disease developing, says Simon Lovestone, professor of old age psychiatry at King's College London.

"One of the things we know is that Alzheimer's starts 10 to 20 years before clinical symptoms appear," he says. "So any drugs targeting the disease are unlikely to be helpful after the clinical disease has started. I'm really interested in whether we can potentially reverse this disease. But to be successful, even to set up clinical trials of new treatments, we need to be able to diagnose it a lot earlier."



*A lumbar puncture to sample spinal fluid*

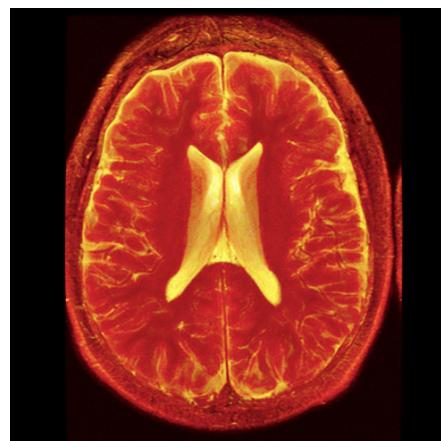
Over the last 10 years, promising developments in detection include the use of lumbar punctures to look for levels of certain proteins in cerebrospinal fluid (which surrounds the brain and spinal cord) and highly specialised scans, called PET scans, to detect protein deposits in the brain. Both of these are being tested in clinical trials on early diagnosis. However, they are expensive and require specialist skills to administer them. Therefore, researchers are looking at the potential of two other methods for early detection of dementia, including Alzheimer's: MRI scans and blood tests.

"So far MRI scans have only been used to rule out conditions other than Alzheimer's. We haven't been able to use them to diagnose the disease," says Professor Lovestone. "But we have now developed a complex

analysis of what they show, which means we can use them to make a positive diagnosis of dementia. In fact, MRIs are now being used to diagnose dementia in routine clinical practice.

"With MRIs, digital data are collected and turned into a photo to see if there has been brain shrinkage. In our analysis, we are able to look at different volumes of atrophy in different regions of the brain and compare this to a large database of normal MRIs. As yet, we cannot differentiate between Alzheimer's and other dementias, but we know that regional patterns of atrophy are different in different disorders, so we hope to be able to do this in future. We are also hoping to use this analysis early – in the pre-dementia phase – in people who have mild cognitive impairment, to predict which of them are likely to go on to develop dementia."

The second area that is interesting researchers is the development of a blood test to look for protein "fingerprints" for Alzheimer's. Using a complex array of technologies, researchers can identify individual proteins in blood samples and compare the levels in people with Alzheimer's and those without the disease.



*MRI scan of the brain*

In the future, it is hoped that blood tests may be able to identify protein deposits in the brain early in the disease, some 10 to 20 years before symptoms appear.

"Levels of certain proteins in the blood may reflect the amount of amyloid protein in the brain well before clinical symptoms," says Professor Lovestone. "So a blood test could eventually be used on people very early in the disease. "We've discovered 30 proteins which are at different levels in the blood of people with Alzheimer's disease. We are now doing a Europe-wide clinical study with samples from control groups and from those with Alzheimer's, to pinpoint the differences further. Within the next year, we will know how the new tests we've developed are functioning and after this we need to set up clinical trials, to try them on large numbers of patients."

One blood protein that has been linked to the development of Alzheimer's is clusterin, which intriguingly has been found in higher levels in the blood as much as 10 years before the first signs of the disease appear in the brain. "At the same time as we discovered this, scientists working in genomics found that a gene for clusterin is associated with Alzheimer's – an amazing coincidence," says Professor Lovestone.

Early diagnosis is valuable to patients and families because it enables them to plan ahead, he says. "But the underlying assumption is that one day we will have the treatment to halt the progression."



*Scientists are studying differences in proteins in the blood of people with Alzheimer's*

## New drugs

Developing drugs is a lengthy and painstaking process. From a key discovery about the disease process, it can take 20 years to develop a drug to target that process and enter it in clinical trials, and another 10 years before the drug will be used in practice. Therefore, discoveries made about Alzheimer's 20 to 30 years ago are only now coming to fruition.

Thirty years ago, the beta-amyloid protein that forms plaques in the brain was discovered. Following this, 20 years ago, two enzymes that generate the protein, called gamma-secretase and beta-secretase (or BACE). Scientists then set out to find drugs to stop that activity. It is only now that these drugs, called gamma-secretase inhibitors and BACE inhibitors, are in clinical trials, with results expected in the next year or two. If they are found to be effective, they could be ready for use soon after.

In the future, says Professor Lovestone, another enzyme, called GSK3, could also be a target for drugs. GSK3 adds phosphate



Developing drugs is a lengthy process

to the tau protein which forms the characteristic tangles seen in Alzheimer's, and drugs to target this enzyme are now entering phase 2 clinical trials, he says.

He is also trying to understand more about the basic processes involved in the disease to identify possible new treatments, in particular how the two abnormalities characteristic of Alzheimer's – amyloid plaques and tau tangles – are related.



Is an Alzheimer's vaccine a possibility?

## A vaccine against Alzheimer's?

Another exciting development according to Clive Ballard, professor of age-related disorders at the Institute of Psychiatry in King's College London, and director of research for the Alzheimer's Society, is a potential vaccine against Alzheimer's, currently being trialled. Although not a vaccine in the usual sense of the word, it is hoped that the drug can clear amyloid plaques from the brain. "We have evidence from initial studies

that the vaccine can do this. The question is whether that is of benefit to patients – whether it will help them in daily life," says Professor Ballard. "Clinical trials of the vaccine on patients with mild to moderate Alzheimer's disease are now at the finishing stage. We will know within two years if the vaccine works or not. It would be very exciting but also bring lots of challenges, since this approach depends on having infusions in hospital, is expensive and requires specialist skills."

## Find out more about dementia and Alzheimer's

### On NHS Choices

Worried about dementia? - [learn the basics about dementia](#)

Health A-Z: Alzheimer's disease - [a straightforward guide to the causes, symptoms and treatments for Alzheimer's disease](#)

Health A-Z: Dementia – [read about the different types of dementia and how they are treated](#)

Carers Direct – [advice on the practical and financial support available if you care for someone with dementia](#)

### Official guideline on dementia treatment

NICE Guidance on Dementia – [medical guidelines detailing the best practice for treating dementia and Alzheimer's disease](#)

NICE: Dementia Quality Standard – [a checklist explaining what high-quality dementia care should provide to patients](#)

National Dementia Strategy – [the Department of Health's plan for improving dementia care and treatment across the UK](#)