



BRAIN HEALTH & DEMENTIA RISK

Benjamin Franklin once said 'The U.S. Constitution doesn't guarantee happiness, only the pursuit of it'. At this point, there is no cure for dementia and scientists and researchers cannot guarantee prevention, but their pursuit of both is relentless.

The evidence on dementia risk reduction is gathering momentum. Throughout Europe, there are many dementia prevention trials including preDIVA (Richard et al., 2009), FINGER (Ngandu et al., 2015) and MAPT (Andrieu et al., 2017).

In 2015, The Atlantic Philanthropies donated €138.4 million to Trinity College Dublin and the University of California, San Francisco, to establish the Global Brain Health Institute (GBHI). The Institute 'works to reduce the scale and impact of dementia around the world by training and supporting a new generation of leaders to translate research evidence into effective policy and practice' (GBHI).

The Brain

The brain is one of the most complex and the most mysterious objects in the universe. It is incredible, we have over 100 billion neurons and they are connected with one hundred trillion connections where the neurons talk to each other.

Information travels around the brain at 268 mph, that is 14 mph faster than a Bugatti Veyron, one of the fastest cars in the world! This 1.5kg object has more connections than the stars in the universe with a memory storage capacity of roughly a million gigabytes. Still think your 128GB iPhone is the ultimate storage machine?

We can take our brains for granted and its only when it stops doing so seamlessly what it does everyday, that we begin to realise how incredible it is.

Risk

Dr. Gerald Edelman who won the Nobel Peace Prize in Physiology and Medicine in 1972 stated that 'every human brain is unique'. We have a good idea of what our brain looks like, but what is going on inside our 'unique' brain?

The adult brain has an impressive wealth of knowledge and experience, all of which we have acquired throughout our lives. By thinking, doing and feeling, our neurons are connecting and growing. This is called neuroplasticity. It is the process in which our brain physically changes.

The brain deals with hundreds of messages every day. It collects this information, sorts it out, thinks, remembers, solves problems and coordinates all these actions at the same time, even when we are asleep.

If we lived until we were 200 years old, would our brain be able to keep up the pace, would there be space for 100 more years of memories and connections? We don't know; but, based on what our brains can do now, it might just be possible.

A risk factor is any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury and risk factors for various diseases around the world include hypertension, obesity and unsafe drinking water (World Health Organisation).

However, there are no guarantees; people can have risk factors and not develop an illness and people who are health conscious can develop a condition despite their protective lifestyle.

Risk factors for dementia

Risk factors have been identified that increase the risk of developing dementia in a population. Some of these risk factors have a strong associated risk such as age, while others like using aluminium pots and pans are considerably weaker.

No single discipline has yet achieved definite answers on dementia risk (IPH., 2015), and there is no strong evidence at this time to claim that lifestyle changes will prevent dementia on an individual basis (ADI, 2014), but they have identified both non-modifiable and modifiable factors which may increase the risk of developing dementia later in life.

Non-modifiable risk factors

Age

Dementia is not a normal process of ageing - we won't all develop dementia.

However age is the most significant risk factor for developing dementia. After the age of 65, the risk of dementia increases slightly and if one is lucky enough to live to 90 and beyond, the risk of developing dementia is considerably higher.

People can develop dementia under the age of 65 and this is known as younger onset dementia.

Gender

In most countries around the world, women on average, live longer than men and as age is the biggest risk factor, women are marginally more likely to develop dementia in later life.

Genetics

Genes play a very important role; they contain information about many of our physical traits, such as the colour of our eyes and our height. In recent years scientists have discovered genes that may increase the risk of developing dementia.

One of the genetic influences on our risk of Alzheimer's disease is a gene called APOE. The gene comes in three normal variations. APOE3 is the most common variation and does not influence risk of Alzheimer's disease, APOE2 is associated with reduced risk and APOE4 is known to increase risk. APOE4 does not cause Alzheimer's disease, it only increases the risk of it developing.

At this time, it is not possible to measure any person's individual genetic risk for dementia.

Modifiable risk factors

Modifiable risk factors are lifestyle factors that we can change and there are several potentially modifiable factors with evidence of an association with the risk of developing dementia. These risk factors include physical inactivity, diabetes, hypertension, less education, obesity, smoking, depression, social isolation and hearing loss (Livingstone, 2017).

Other risk factors include high cholesterol and traumatic brain injury.

Changes we can make

Education

Research supports a protective effect of educational attainment on dementia risk reduction later in life (IPH., 2015).

Scientists use what they call cognitive reserve to try to explain this. Cognitive reserve tries to explain why some people have better 'reserve' and more brain connections which might offer some protection against developing dementia. It is a theoretical construct; meaning that it is something that scientists believe to exist because it explains a number of associations, but they cannot directly measure or observe it. Education and being socially active are great ways of building 'cognitive reserve'.

Smoking

There are over 7000 chemicals in cigarette smoke including nicotine, carbon monoxide, arsenic, ammonia and acetone (Irish Cancer Society). It is widely known that smoking is a risk factor for cardiovascular disease and stroke and research shows that it may also

increase the risk of developing dementia because of smoking's harmful effects on cardiovascular health (ADI, 2014).

The health effects of exposure to secondhand smoke are similar to those of first hand smoking and there is evidence that passive smoking may also be associated with increased risk of cognitive impairment and dementia (Llewellyn, et al., 2009). But what is interesting and encouraging from the research, is that former smokers are at a similar risk of developing dementia to populations who have never smoked (ADI., 2014).

Physical activity

The health benefits from engaging in exercise are well known such as reducing the risk of obesity and cardiovascular disease. Exercise stimulates the production of brain-derived neurotrophic factor (BDNF), this little protein helps to form connections between brain cells, great for our neuroplasticity brain machine. Experts recommend that we all should do at least 150 minutes of cardiovascular exercise every week. Exercising also releases endorphins, so you'll feel great too!

Diet

Dietary factors have been associated with dementia risk for many years and diets such as the Mediterranean diet have been identified as potentially reducing the risk of dementia in part due to their heart healthy properties.

Much coverage has been given, particularly in the media to the antioxidant benefits of vitamins including vitamin C and E and the protective benefits of Omega 3.

Antioxidants reduce the damage caused by free radicals and some studies have suggested that these antioxidants may have a protective role to play in brain health. However, there is no consistent evidence to confirm a relationship between these nutrients and dementia risk reduction and cognitive decline (ADI., 2014).

Alcohol

Alcohol is a drug, it is highly addictive and it isn't brain friendly. Ireland has the highest rate of alcohol consumption in Europe with over 1.4 million people in 2013 classed as harmful drinkers (IPH., 2015).

Excessive amounts of alcohol over a prolonged period of time may increase the risk of developing dementia.

Research points to lower rates of dementia among populations of light to moderate drinkers in comparison to people who have never drunk and heavy drinkers (ADI., 2014).

However, current evidence is not sufficient enough to advise people who are not drinkers to incorporate alcohol into their daily lives, likewise there are no health reasons to advise people who are light to moderate drinkers to change their behaviour (ADI., 2014). The harmful effects of heavy drinking on the brain is very well established and people who are heavy drinkers are at risk of developing Korsakoff's disease and other alcohol related dementias.

Hypertension

Hypertension or high blood pressure is quite common, between 30-40% of people in Ireland have hypertension, however many don't know it (HSE). If hypertension is untreated it increases the risk of stroke and cardiovascular disease.

Hypertension is mostly preventable through healthy lifestyle choices such as eating a healthy diet and exercising.

There is evidence between hypertension during midlife and the risk of dementia in later life and many studies in the area have reported strong associations between both.

Hypertension is silent and symptomless and often isn't detected until it is measured, so it is important to visit a GP to get this checked.

Cholesterol

A history of high cholesterol is associated with a higher risk of developing dementia and even slightly elevated cholesterol levels can also increase the risk.

Again, like hypertension, the risk is age dependent, with high cholesterol during midlife demonstrating the most consistent findings (IPH., 2015).

GPs can check cholesterol with a simple blood test, people with a family history of high cholesterol should have their cholesterol checked regularly by their doctor.

Diabetes

Diabetes affects how our body uses glucose. Glucose is the main sugar in the body and we get glucose from the food we eat. After we eat, our glucose levels rise, our pancreas produce insulin and release it into our bloodstream.

People who have Type 1 diabetes don't produce insulin, while people who have Type 2 diabetes produce insulin, but their body ignores it.

Unlike Type 1 diabetes, most cases of Type 2 diabetes are preventable and result from unhealthy lifestyle choices such as poor diet and lack of physical exercise.

The occurrence of Type 2 diabetes during later life seems to have a greater effect on the risk of developing dementia than during midlife, however the duration of a person's diabetes may be a more important determinant of risk during midlife (ADI., 2014).

Obesity

Obesity is being dangerously overweight, Like hypertension, obesity and risk of dementia is again focused at midlife.

Researchers at the University of Pittsburgh scanned the brains of 94 people over the age of 70 (Raji et al., 2010) . They were looking to see were there differences in the brains of people who had different BMI readings and it produced some very interesting results.

Results from this study showed that the obese group (BMI over 30) had 8% less brain tissue and their brains looked 16 years older than the group with a normal BMI under 25. The overweight group (BMI 25-30) had 4% less brain tissue and their brains looked eight years older than the normal weight group.

In the next decade, Ireland is set to become the most obese nation in Europe (WHO); as a nation, we need to have healthier waistlines. Obesity not only harmfully transforms your physical appearance, but it also might have long-term consequences for your brain health too.

Conclusion

At the moment there is no single way to prevent dementia.

Interventions for risk factors including increasing childhood education, physical activity, maintaining social engagement, reducing smoking, and management of hearing loss, depression, diabetes, and obesity might have the potential to delay or prevent a third of dementia cases (Livingston et al., 2017).

There are no negatives to adopting a healthier lifestyle; we know much more then previous generations about the dangers of smoking, high blood pressure and obesity.

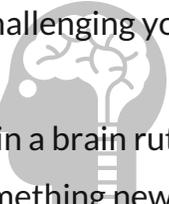
This opportunity is ours for the taking.

Five Steps to a Healthy Brain

Challenge your brain

Being smart is more than facts and knowledge it's being resourceful and insightful and challenging your brain in different ways.

Don't get stuck in a brain rut, challenge your brain. Learn something new, take up a new hobby, you might discover a talent you never thought you had!



Exercise

You don't have to join a gym or become a marathon runner, 30 minutes of cardiovascular exercise five days a week will keep your brain healthy and happy and because exercise releases endorphins, you'll also feel great.

If you're unsure about what exercise to choose, or if you have a previous injury, ask your GP for advice.



Eat a healthy diet

A healthy diet is really important for both a healthy heart and a healthy brain. Fruit, vegetables, nuts, pulses and fish are all great healthy options.



Take care of your heart

Hypertension, high cholesterol, obesity and Type 2 diabetes are mostly preventable and can be managed by adopting a healthier lifestyle.

The next time you visit your GP, get your blood pressure, cholesterol, blood sugar levels and BMI checked.



Stay socially connected

Connecting and interacting with people helps to grow new connections in the brain. Meet friends and family for a cup of tea or other activities you enjoy doing together.



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Useful links

The Alzheimer Society of Ireland Keeping you brain healthy
<https://www.alzheimer.ie/Brain-Health.aspx>

Hello Brain <http://www.hellobrain.eu/en/>

Neuro Enhancement for Independent Living (NEIL)<https://www.tcd.ie/Neuroscience/neil/>

FreeDemLiving <http://freedemliving.com/>

Global Brain Health Institute
<http://www.gbhi.org/>

The Centre for Dementia Prevention
<http://centrefordementiaprevention.com/>

