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News Release

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Gene study sheds light on memory power and performance

Scientists have discovered genes that are linked to having a good memory in middle and later life.

Researchers identified common genetic variants – changes in a person's genetic code – that are associated with the ability to recall lists of words and stories.

It is the first time that scientists have found such a link and they say that the finding could help predict those who will experience memory difficulties in old age.

The Cohorts for Heart and Aging Research in Genomic Epidemiology (CHARGE) Constortium, which includes experts at the University of Edinburgh, analysed data from 30,000 people, aged more than 45 years old.

The participants' – none of whom had dementia – took memory tests that included recalling set words and stories after assigned time period.

Researchers then analysed the results alongside details of each person's genome to identify genetic variants or changes associated with lower memory scores.

People with lower scores overall were found to have variants near a gene called Apolipoprotein E and another gene involved in immune response.

Those with a lower score in recalling short stories had variants near Apolipoprotein E, while those with a poor ability to remember word lists had a mutation near the gene involved in immune response.

To confirm the findings, researchers examined post-mortem brain tissue samples and found that those with the genetic variants related to poorer memory test scores were more likely to have very early signs of Alzheimers disease.

This finding builds on previous research on Apolipoprotein E, which has found that some forms of the gene are associated with increased risk of dementia, including Alzheimer's disease.

Professor Ian Deary, Director of the Centre for Cognitive Ageing and Cognitive Epidemiology at the University of Edinburgh and a lead author on the study, said: "These

international collaborations help us to find the small individual genetic variants that contribute to memory and other important skills. Once we find them, the hope is that they will lead us to the mechanisms that underpin healthy cognitive ageing."

Scientists say that the findings could help shed more light on the possible link between immune system problems and age-related memory loss.
Lead author, Stéphanie Debette, MD, PhD, at Boston University School of Medicine, added: "Interestingly, genetic variants associated with memory performance also predicted altered levels of expression of certain genes in the hippocampus, a key region of the brain for the consolidation of information. The differential associations according to memory test characteristics and age should be accounted for in future studies."

The study, published in *Biological Psychiatry*, involved researchers in the UK, the US, France, Germany, Switzerland, Austria, Finland, Holland, Croatia, Australia and Taiwan.

It also included data from five studies based at the University of Edinburgh including The Lothian Birth Cohort 1921, the Lothian Birth Cohort 1936, the Orkney Complex Disease Study (ORCADES), and the Croatia-Korčula and Croatia-Split cohorts.

The Lothian Birth Cohort 1921 and the Lothian Birth Cohort 1936 are part of a larger project called the Disconnected Mind, which is supported by Age UK.
It is also supported by the Medical Research Council (MRC) and the Biotechnology and Biological Sciences Research Council (BBSRC).
The Orkney Complex Disease Study (ORCADES) is a genetic study based in the Orkney isles and is funded by the Chief Scientist Office of the Scottish Government, the Royal Society, the MRC Human Genetics Unit, Arthritis Research UK and the European Union framework program 6.

The Croatia-Korčula and Croatia-Split cohorts, a genetic study by of The University of Split and The University of Edinburgh is supported by grants from the MRC, the Ministry of Science, Education, and Sport of the Republic of Croatia, the European Union.

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