New molecular test reveals biological age and could help detect Alzheimer's

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A collaborative research team involving scientists at King's College London, and funded in part by Alzheimer's Research UK and the Medical Research Council (MRC), has discovered a panel of molecular markers that may be able to identify how well a person is ageing.

Low scores were also found to correlate with cognitive decline and researchers hope the findings could reveal a potential new way to detect diseases like Alzheimer's.

The researchers from King's, together with teams from Sweden, Denmark and the US, studied a molecule called RNA. RNA is a molecular 'middle-man' – translated from a person's [genetic code](#) and used to instruct cells in the body what proteins to make and how to function. RNA is not only influenced by the particular genetic code a person carries but also by lifestyle and environmental factors, which dictate whether some genes are switched on or off. Studying RNA not only gives researchers an idea of the genes a person has inherited, but how that person's life has influenced the expression of these genes.

The team started by studying RNA in [muscle tissue](#) from 15 people aged 19-28 years and 15 healthy people aged between 59 and 77. They used specialist 'chips' to study the amount of RNA – and therefore the gene expression – in the muscle tissue and identified 150 genes that differed between people in the two age groups. They then repeated these findings using other sets of muscle samples.

The same 150-gene profile was then used to study 108 muscle samples from 70-year old men. The team found that their 'healthy ageing' score varied, showing that people with the same age on paper can have a range of different 'biological ages' at least as judged by the gene profile. The score was not related to markers of other health conditions such as blood pressure or cholesterol.

When the researchers used the same profile to study brain tissue they found the 'healthy ageing' genes could also categorize in the samples of donated brain tissue from younger and older people. The team then studied the 'healthy ageing' profile in RNA from blood and brain tissue and found the highest scores in healthy older people, with lower scores in people with early cognitive decline and Alzheimer's disease.

Dr Eric Karran of Alzheimer's Research UK, the UK's leading dementia research charity, said:

"Advances in genetic technologies over the past decades are now allowing scientists to profile the complexities of the human body in more detail than ever before. One of the biggest questions in human biology is how we age, and how this process impacts our wider health and risk for conditions like Alzheimer's. This study suggests a way to measure a person's 'biological age' and could reveal insights into the ageing process and why some people are more susceptible to age-related health conditions. The 'biological age' measured by this test did not seem to be altered by important health parameters such as blood pressure, which we know can be risk factors for dementia. It will be important to determine how the 'biological age' score interacts with known population genetic risk factors for diseases like Alzheimer's. Much of the data in the study represents a snapshot in time, and it will be important to explore further how a person's biological age score correlates with their health and survival in later life.

"There is much interest in developing a blood test for diseases like Alzheimer's but such a test would need rigorously validating to show it was accurate and sensitive before it could be used in the clinic. Furthermore, tests that confirm actual pathological changes in the brain will continue to be used for confirming or ruling out clinical diagnoses. This study will need to be repeated and validated in a larger group of people to know whether it could be a useful clinical test for Alzheimer's or how it could improve current research practices. With an increasingly ageing population in the UK and around the world, it's important to invest in research in this area to help understand and improve health today and for future generations."

Provided by Alzheimer's Research UK