

guardian.co.uk

Living fast? Scientists show lifespan is linked to DNA

Discovery of gene sequence could aid drug design for age-related illnesses

Ian Sample, science correspondent
guardian.co.uk, Sunday 7 February 2010 19.55 GMT

[A larger image](#)



The study found people who had the gene sequence were biologically 'older' than people of the same age chronologically. Photograph: Yuriko Nakao/Reuters

Scientists have isolated a gene sequence that appears to determine how fast our bodies age, the first time a link between DNA and human lifespan has been found.

The discovery could have a profound impact on public health and raises the best hope yet for drugs that prevent the biological wear and tear behind common age-related conditions such as heart disease and certain cancers.

The work is expected to pave the way for screening programmes to spot people who are likely to age fast and be more susceptible to heart problems and other conditions early in life. People who test positive for the gene variant in their 20s could be put on cholesterol-lowering statin drugs and encouraged to exercise, eat healthily and avoid smoking.

The breakthrough is unlikely to lead to drugs that dramatically extend lifespan, but doctors say it may help prolong the lives of patients whose genes make them susceptible to dying young.

The research gives the kind of insight into the biology of ageing that has not emerged from work on other strategies that claim to extend lifespan, such as consuming vast quantities of antioxidants or pursuing a severely calorie-restricted diet.

"This may help us identify patients who are at a greater risk of developing common age-related diseases so we can focus more attention on them," said Professor Nilesh Samani, a cardiologist at the [University of Leicester](#), who led the research.

The research highlights the difference between chronological age and biological age, the latter of which is determined by our genetic makeup and lifestyle factors, such as diet and smoking. Two people of the same age can have biological ages that differ by more than 10 years.

A team led by Samani and Professor Tim Spector at King's College, London found a common sequence of DNA was strongly linked to a person's biological age. In a study of nearly 3,000 people, around 38% inherited one copy of the gene variant and were biologically three to four years older than those who did not carry the sequence.

A minority of 7% inherited two copies of the DNA sequence and were on average six to seven biological years older. The majority of the population, 55%, do not carry any copies of the variant.

The study, published in the journal *Nature Genetics*, was prompted by the huge variability in the age at which people develop medical problems that are often considered diseases of the elderly.

"I see patients in their 80s with high blood pressure who have healthy coronary arteries and I see people in their 40s who don't seem to have any risk factors yet have advanced heart disease," Samani said. "We think this kind of variability must have something to do with premature ageing."

Most of the cells in our bodies contain long molecules of DNA called chromosomes that have protective caps at either end called telomeres. Every time a cell divides, the telomeres shorten, like plastic tips fraying on a shoelace. When the telomeres become very short, the cell starts to malfunction and show signs of ageing.

From blood samples, Samani and Spector found a particular gene sequence was more common in people who had unusually short telomeres for their age. The section of DNA was found on chromosome three, next to a gene called TERC, which makes an enzyme that repairs telomeres when they shorten.

People who carry one or two copies of the genetic sequence probably make less of the enzyme, called telomerase, when they are growing in the womb. This means they are born with shorter telomeres, and so are prone to ageing more quickly.

"The effect may be built in at a very early stage in life. If you're born with shorter telomeres, there's evidence you will be prone to heart disease and other age-related diseases," Samani said.

Scientists are unlikely to reverse the ageing process by boosting telomerase in people's bodies. Telomerase is almost completely deactivated after birth, but is switched back on in cancer cells so they can divide endlessly without dying. "Introducing telomerase might protect you from heart disease, but if you turn it on willy nilly you could cause cancer instead," Samani said.

guardian.co.uk © Guardian News and Media Limited 2010