Key genes that switch off with aging highlighted as potential targets for anti-aging therapies

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Researchers at King's College London, in collaboration with the Wellcome Trust Sanger Institute, have identified a group of 'ageing' genes that are switched on and off by natural mechanisms called epigenetic factors, influencing the rate of healthy ageing and potential longevity.

The study also suggests these epigenetic processes – that can be caused by external factors such as diet, lifestyle and environment – are likely to be initiated from an early age and continue through a person's life. The researchers say that the epigenetic changes they have identified could be used as potential 'markers' of biological ageing and in the future could be possible targets for anti-ageing therapies.

Published today in *PLoS Genetics*, the study looked at 172 twins aged 32 to 80 from the TwinsUK cohort based at King's College London and St Thomas' Hospital, as part of King's Health Partners Academic Health Sciences Centre.

The researchers looked for epigenetic changes in the twins' DNA, and performed epigenome-wide association scans to analyse these changes in relation to chronological age. They identified 490 age related epigenetic changes. They also analysed DNA modifications in age related traits and found that epigenetic changes in four genes relate to cholesterol, lung function and maternal longevity.

To try to identify when these epigenetic changes may be triggered, the researchers replicated the study in 44 younger twins, aged 22 to 61, and found that many of the 490 age related epigenetic changes were also present in this younger group. The researchers say these results suggest that while many age related epigenetic changes happen naturally with age throughout a person's life, a proportion of these changes may be initiated early in life.

Dr Jordana Bell from King's College London, who co-led the study said: 'We found that epigenetic changes associate with age related traits that have previously been used to define biological age.

'We identified many age-related epigenetic changes, but four seemed to impact the rate of healthy ageing and potential longevity and we can use these findings as potential markers of ageing. These results can help understand the biological mechanisms underlying healthy ageing and age-related disease, and future work will explore how environmental effects can affect these epigenetic changes.'

Dr Panos Deloukas, co-leader of the study from the Wellcome Trust Sanger Institute, said: 'Our study interrogated only a fraction of sites in the genome that carry such epigenetic changes; these initial findings support the need for a more comprehensive scan of epigenetic variation.'

Professor Tim Spector, senior author from King's College London, said: 'This study is the first glimpse of the potential that large twin studies have to find the key genes involved in ageing, how they can be modified by lifestyle and start to develop anti-ageing therapies. The future will be very exciting for age research.'

Provided by King's College London

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