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Scientists to unlock the secrets of the biological clock

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Scientists in Leicester are tackling two of the most critical questions to ageing – why do some people stay healthy in older age while others succumb to chronic disease, and what can we do about it?

The pioneering work is led by Sir Nilesh Samani, British Heart Foundation (BHF) Professor of Cardiology at the University of Leicester and Dr Veryan Codd, Lecturer in Cardiovascular Molecular Biology whose team, working with John Danesh, BHF Professor of Medicine and Epidemiology at the University of Cambridge, will take a close look at the way in which human cells withstand the passage of time.

They are particularly interested in tiny pieces of DNA called telomeres, which cap the ends of each chromosome and which shorten each time the cell divides. Eventually, they shorten enough to signal to the cell that it is time to die.

Interestingly, some people are born with shorter telomeres than others and some people have telomeres that shorten more quickly than others.

The scientists speculate that people who "biologically" age more quickly than others, as indicated by their telomere length, may develop diseases like heart disease and cancer at an earlier age, while others remain healthy to an advanced age despite similar lifestyles (which play a part in the development of disease).

The £2 million study is the largest of its kind ever undertaken and will

help improve understanding of the biological ageing process. It is funded by the Medical Research Council (MRC), British Heart Foundation (BHF) and the Biotechnology and Biological Sciences Research Council (BBSRC). It uses samples from UK Biobank, a major national health project that is following the lives of 500,000 volunteers who donated blood and provided lots of information about their health and lifestyles for research over many years.

The scientists will measure the average length of telomeres in all half a million UK Biobank participants, providing a rich resource of information for researchers studying a wide range of diseases.

"UK Biobank gives us a wonderful opportunity to study the mechanics of biological ageing, identify environmental and lifestyle determinants of telomere length and to better understand the importance of the variation in telomere length between individuals," said Professor Samani. "We are particularly excited to link our telomere length measurements to the genetic data that will be generated on all the UK Biobank participants, as this can help to establish whether any association we find between shorter telomeres and disease is a causal one."

The work will help with research into heart disease, which is Professor Samani and Dr Codd's particular area of interest. Their previous work has shown an association between shorter telomere length and risk of coronary heart disease.

Telomere length has also been linked to a range of cancers, and may be helpful in indicating prognosis.

Scientists studying dementia and other ageing diseases of the brain and diseases of muscle and bone are among other researchers in a wide range of areas who are also interested in the work.

"As the volunteers in UK Biobank get older and some develop age-related diseases and others not our telomere data will become increasingly valuable," said Professor Samani, who is also a Consultant at Leicester's Hospitals, based at Glenfield Hospital.

"Combining unprecedented scale and detail, our study has considerable potential to yield new and exciting insights into the biology and causes of ageing and age-associated diseases which may open up new avenues for prevention and treatment.

"The immense societal challenge posed by an increasingly ageing human population underscores the importance and relevance of this work."

Provided by University of Leicester