

Twins studies to identify the molecular cause of ageing

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What makes us age biologically? We have always been intrigued by this question. Yet, it remains a fundamental research challenge. Now, the EU-funded project, EurHEALTHAgeing, aims to draw together studies of early development with those on longevity and ageing. By doing so, it hopes to decipher the molecular workings that lie behind how we age. But also explain why we get age-related diseases. Scientific coordinator Ana Valdes, a senior lecturer in statistical genetics at King's College

London and associate professor at the faculty of medicine and health sciences at the University of Nottingham, in the UK, talks to youris.com about the role of nature versus nurture in ageing. She also talks about the importance of twin studies, epigenetics and how technology is helping us understanding ageing.

To what extent do nature and nurture play a role in how we age and how long we live?

It is difficult to say for the [ageing process](#). But if we look at something like longevity—that is at people who live over the age of 85—that tells us something about ageing. The phenomenon has a [genetic contribution](#) of between 20% and 25%. This means that 75% to 80% of what determines how long we live is not genetically determined. And therefore must be due to our lifestyle, environment, nutrition, among others.

What is the purpose of studying twins?

We can analyse twins by looking at their genes, or by looking at changes surrounding their genes, so-called epigenetic changes. And we can also study them by looking at small compounds in their blood serum, called metabolites. The advantage with [identical twins](#) is, if we find something interesting, that we do not have to make any adjustments for gender, age, family history, etc. So if we find a difference in the level of a protein, and we see that cardiovascular risk is going in the same direction, that tells us we might want to look further into the effect of this protein.

How can twins studies help tell us understand how pollution may influence our health?

One thing we have been looking at is environmental exposures. In

collaboration with Frank Kelly, professor of [environmental health](#) from King's College London, UK, we used satellite mapping for London. And we ascribed exposure to certain pollutants in air depending on which postcode the twin resided in. If you look at 500 to 600 individuals you do not find a strong correlation between pollution exposure and something like blood pressure. But you do find an association between exposure and things that are present in the blood. This means that disease metabolites may offer a powerful way of uncovering the role of the environment in something like heart disease.

Why is it necessary to focus on so-called epigenetic effects and not just genes when it comes to ageing?

Genes received a lot of attention in the last two decades. And rightly so! This was a way of looking at molecular processes in humans. Also we could use animals to better understand ageing using genetics. But now, we have instruments that allow us to measure so many parameters non-invasively in humans. We are finding that factors other than genes play a big role in health outcomes. The environment seems to have an even bigger impact than the genetic effects. For example, we know that the nutrition a baby in the womb receives affects their biology for the rest of their lives. This happens when conditions affect the structure around genes [so-called [epigenetics](#)] and influences how they work. And we can see these effects now by just looking at a blood sample.

How have advances in technology improved our ability to study the influences of genes, epigenetics and molecules?

You can now look at panels with hundreds of metabolites, all measured simultaneously in blood and just requiring a very small sample. Also, for epigenetics, you can look at 450,000 sites on the human genome that can

be changed by methylation. It is a really powerful approach to testing a huge number of hypotheses. So you can get literally tens of thousands of points of data.

Provided by Youris.com

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