Secrets of youth, based on prevention

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Metabolites found in our blood are linked to ageing and can signpost the risk of developing age-related diseases. This may help avoid such risks and reduce the rate at which we age biologically.

We age in two ways. There is the ageing we count by clock and calendar. And then there is biological ageing. The latter is written into our genes. But, it is also influenced by our lifestyle and history. And while we cannot stop time ticking by, there may be ways to test for our biological

age and take steps to slow it down. Now, the EU-funded project,EurHEALTHAgeing, due to be completed in 2015, aims to track our biological age and future health prospects, by looking for special tell-tale molecules in our blood. Ultimately, it may be possible to find steps to slow our biological age down.

"We are trying to predict healthy ageing by taking a blood sample and looking at certain compounds in there," says 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. "We hope that in a few years we will be able to look at your molecular profile and tell you about your risks for certain disease. And whether you will age healthily or not," she tells youris.com.

Genes have a say in how we age, but much more significant is the wrapping that goes around those genes. This wrapping includes special chemical groups that can cloak our genes, in a process called DNA methylation. And cloaking alters which genes are active at any given time. What determines methylation, and thus gene activation, is our lifestyle. Things like diet, experiences, exercise, our environment, our exposure to pollutants. Such, so called epigenetic changes can affect our biological age—whether we age faster or slower, healthily or unhealthily.

By examining special biomarker molecules in the blood—such as molecules resulting from human metabolism reactions, referred to as metabolites— project researchers hope to spot tell-tale signs of these epigenetic changes. Deciphering these molecular imprints, knowing what risks they are signposting and then taking steps to avoid these risks could help us age slower and better.

"We cannot yet offer a diagnosis, but the idea would be to find a panel of metabolites that can predict [ageing]. You take a blood sample, look

at the DNA and say what your risks are," says Valdes. "We could tell someone in their 40s that they have these markers and are at a higher risk or cardiovascular disease. And that they would benefit most from intervention, which might be weight loss, reducing salt intake or whatever it may be," she explains to youris.com.

Project researchers have already discovered one particular metabolite that is strongly linked to age. But it is also linked to lung function, bone mineral density and birth weight. The discovery came when the blood of 6,055 people was examined, all of whom came from a registry of twins in the UK. Stored blood samples from a large group of Finnish people born in 1966 and in 1986 are also being used in the search for clues, along with a group of people born in Hertfordshire, in the UK, in the 1930s.

One expert commends the project's approach. It offers a path to "better insight into the traits that influence the ageing process," says Wolfgang Wagner, leader of the stem cell biology and cellular engineering research group at RWTH Aachen University Medical School, in Germany. "This may also help to improve healthy ageing," he adds. He recentlyreported a way of testing the biological age of blood by looking at DNA methylation changes. And he holds an alternative view to ageing than the mere increase of unfavourable cellular changes: "Ageing might rather be considered as a developmental process rather than accumulation of stochastic cellular defects," he tells youris.com.

Another expert welcomes such work, which can contribute to a better understanding of longevity "We must figure out why some people live so long, that is the secret we must reveal," says Gil Atzmon, an associate professor in the division of endocrinology at the Albert Einstein College of Medicine, News York, USA. "We think it is about the interaction between our DNA and the environment. If there is a miscommunication between where your DNA predicts you to live and your environment,

you will die earlier," says Atzmon. "When we understand why some people live so long and healthily and the interaction between our environment and DNA, then we can translate that into a treatment for people who don't live long, healthy lives. That could be a drug, a supplement, it can be food, sunlight or whatever," he concludes.

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