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# Natural compound found in dark chocolate and coffee is directly linked to slower aging



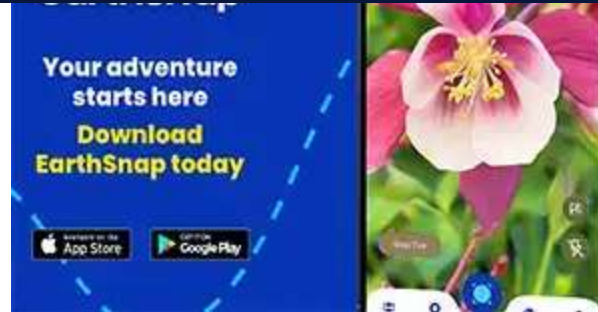
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Eating dark chocolate might be doing more than satisfying your cravings, it may also be slowing how your cells age. In about 1,600 adults, scientists at King's College London (**KCL**) found that higher blood levels of theobromine, which is a natural chemical found in cocoa beans, matched slower biological aging in their study.

The work was led by Dr. Ramy Saad at KCL. He is a geneticist whose research focuses on how molecules influence DNA aging markers in human blood.



Biological age, an estimate of how worn your organs and tissues appear, can sometimes fall below or above your birthday count.

Researchers estimate biological age using epigenetic clocks, calculations based on DNA methylation marks, and one of the strongest is called [GrimAge](#).

Another tool, the DNA methylation estimator of TL, referred to as a [DNAmTL](#) measure, infers telomere length from methylation patterns so researchers can follow how protective caps shorten with age.

## Why theobromine matters

Theobromine belongs to a family of plant chemicals called [alkaloids](#), naturally occurring compounds that often protect plants by affecting animal nervous systems.

In cocoa and coffee, theobromine sits alongside caffeine in a group of [methylxanthines](#), stimulant molecules that act on heart and brain cells.

Animal and human studies suggest theobromine may influence blood pressure, cholesterol, and inflammation, as reviewed in [analysis](#) of cardiovascular risk factors.

Although theobromine is harmless to most people at typical food doses, it is famously toxic to dogs because they clear it very slowly.

## DNA and dark chocolate chemistry

The team measured theobromine in blood samples using metabolomics, laboratory techniques that catalog many small molecules in serum at once.



The researchers adjusted their models for age, weight, smoking, and family relatedness, then tested whether higher theobromine aligned with younger epigenetic clocks.

They also repeated analyses while including other cocoa and coffee metabolites, asking whether caffeine or related compounds could explain any apparent aging signal.

## Theobromine and cellular aging

Across cohorts, higher theobromine in blood linked to slower GrimAge acceleration and longer telomere estimates, meaning people with this molecule looked younger.

When the models included caffeine and other related methylxanthines, the signal for theobromine remained, suggesting the association was not just a coffee artifact.

In analyses that separated never-smokers from people who had smoked, theobromine's link to slower epigenetic aging appeared strongest among former-smokers.

The associations were also stronger when theobromine and methylation were measured closer together, which suggests the signal reflects recent exposure.

## Length of telomeres in cells

Telomeres, repetitive DNA sequences that cap chromosome ends and help preserve genetic information, naturally shorten as our cells divide throughout life.

Shorter telomeres correlate with higher risks of heart disease, cancers, and earlier death, so scientists treat them as an indicator of accumulated damage.

In the new analysis, higher theobromine levels matched longer DNAmTL estimates, which suggests people with more exposure may maintain telomere length better.



## How compounds interact

Dark chocolate also contains [polyphenols](#), plant-derived molecules that influence blood vessels, inflammation, and DNA methylation patterns in laboratory and human studies.

Randomized trials of cocoa flavanols have reported improvements in blood pressure and vessel function, and a [review](#) found reductions in adults.

“Our study finds links between a key component of dark chocolate and staying younger for longer.” That comment came from Professor Jordana Bell, a professor of epigenomics at KCL.

The work raises the possibility that theobromine helps amplify the cardiovascular benefits of cocoa’s polyphenols, rather than acting as a lone player.

## Theobromines, diet, and aging

For now, the findings mainly reinforce existing advice to focus on overall diet quality rather than chasing single nutrients as magic bullets.

Dark [chocolate](#) usually comes with sugar and fat, so any potential benefit from theobromine has to be weighed against calories and health conditions.

For people who already enjoy dark chocolate, nutrition researchers suggest choosing products with higher cocoa percentages and keeping portions modest to support health.

Other sources of theobromine, such as unsweetened cocoa powder or dark chocolate, offer exposure with less sugar when added to recipes or drinks.

## Many questions remain

This research is observational, meaning it identifies statistical links but cannot prove that increasing theobromine will directly slow anyone’s biological aging.



"This is a very exciting finding, and the next important questions are what is behind this association." That reflection came from Dr. Saad.

To move from correlation to guidance, researchers would need controlled trials that change theobromine exposure and track health and aging outcomes over time.

## Chocolate, theobromines, and aging

One question is whether theobromine drives the association, or whether it works together with cocoa flavanols and other plant compounds to influence aging biology.

The work also highlights the power of large population datasets, where subtle molecular signals can emerge when thousands of measurements are analyzed together.

"This study identifies another molecular mechanism through which naturally occurring compounds in cocoa may support health," said Dr. Ricardo Costeira, a postdoctoral researcher working at KCL.

Future work will likely combine laboratory experiments, detailed dietary records, and targeted supplementation trials to clarify how theobromine interacts with human aging.

The study is published in [Aging](#).

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