Presence of specific lipids indicate tissue aging and can be decreased through exercise, study shows

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Scientists have discovered that a type of fat accumulates as tissue ages and that this accumulation can be reversed through exercise. Researchers

from Amsterdam UMC, together with colleagues from Maastricht UMC+, analyzed both mice and human tissue before and after exercise allowing them to draw this conclusion. The results are published today in *Nature Aging*.

"The idea that we could reverse aging is something that was long considered science fiction, but these findings do allow us to understand a lot more about the aging process," says Riekelt Houtkooper, Professor at the laboratory Genetic Metabolic Diseases of Amsterdam UMC.

"Everyone says that 'it's just part of getting older,' but this doesn't actually have to be true. By understanding more about the aging process, we can also look into new ways of intervening," says Georges Janssens, first author of the paper and assistant professor at Amsterdam UMC.

In recent years, laboratory research has shown that we may be able to counteract age-related diseases by intervening in the fundamental processes that lead to aging. Although science has increasingly mapped out how metabolism changes during aging, large parts remained uncharted.

"We wanted to add a new chapter to the atlas. Lipids are an important part of our diet, and crucial for the functioning of our body cells. Specific lipids make up the membrane of cells, which ensures that the inside and outside remain separate," says Houtkooper.

In order to add this new chapter, the research team investigated how the composition of fats changes in mice. They looked at ten different tissues, including muscles, kidneys, liver and heart. It was noticed that one type of lipid, the bis(monoacylglycero)phosphates (or BMPs), were elevated in all tissues from the older animals. Suggesting an accumulation of these lipids during aging. They then investigated whether this also happens in humans.

Although it was not possible to obtain as many different tissues, the accumulation of BMP was also visible in muscle biopsies of older people. Finally, they then completed more muscle biopsies from people before and after a healthy intervention that included one hour of exercise a day and saw the level of BMPs decreased in the active participants.

"These results are an important new step for our understanding of the aging process, but they are certainly not the final answer. We plan to conduct follow-up studies to better understand how BMPs contribute to aging, what are the consequences of BMP accumulation on the aging process, and whether this can only be influenced by exercise or are the other ways to affect BMPs levels," concludes Houtkooper.

More information: A conserved complex lipid signature marks human muscle aging and responds to short-term exercise, *Nature Aging* (2024). DOI: 10.1038/s43587-024-00595-2

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