

Do women age differently from men?

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Rapamycin prolongs lifespan only in female fruit flies. Credit: K. Link/Max Planck Institute for Biology of Ageing

The effect of medicines on women and men can differ significantly. This also applies to the currently most promising anti-aging drug rapamycin, as researchers from the Max Planck Institute for Biology of Ageing in Cologne and University College London have now shown. They report in *Nature Aging* that the drug only prolongs the lifespan of female fruit flies, but not that of males.

In addition, rapamycin only slowed the development of age-related pathological changes in the gut in female flies. The researchers conclude that the [biological sex](#) is a crucial factor in the effectiveness of anti-aging drugs.

The life expectancy of [women](#) is significantly higher than that of men. However, women also suffer more often from age-related diseases and [adverse drug reactions](#). "Our long-term goal is to make men live as long as women and also women as healthy as men in late life. But for that, we need to understand where the differences come from," explains Yu-Xuan Lu, one of the leading authors of the study.

Rapamycin extends lifespan only in female flies

The researchers gave the anti-aging drug rapamycin to male and female fruit flies to study the effect on the different sexes. Rapamycin is a cell growth inhibitor and immune regulator that is normally used in [cancer therapy](#) and after organ transplantations.

They found that rapamycin extended the lifespan and slowed age-related intestinal pathologies in female flies but not in males.

Healthier life due to more autophagy

The researchers observed that rapamycin increased autophagy—the cell's waste disposal process—in the female intestinal cells. Male intestinal cells, however, already seem to have a high basal autophagy activity, which cannot be further increased by rapamycin. The scientists could also see this effect of rapamycin in mice.

Female mice showed increased autophagy activity after treatment with rapamycin. "Previous studies found that females had greater responses to

[rapamycin](#) on lifespan extension than did [males](#) in mice, we now uncover an underlying mechanism of these differences using flies," says Yu-Xuan Lu.

"Sex can be a decisive factor for the effectiveness of anti-aging drugs. Understanding the processes that are sex-specific and determine response to therapeutics will improve the development of personalized treatments," explains Linda Partridge, senior author of the study.

More information: Jennifer Regan, Sexual identity of enterocytes regulates autophagy to determine intestinal health, lifespan and responses to rapamycin, *Nature Aging* (2022). [DOI: 10.1038/s43587-022-00308-7](https://doi.org/10.1038/s43587-022-00308-7)

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