# Scientists extend mice lifespan by 30% with combined cancer drugs trametinib and rapamycin



Scientists are making significant strides in the quest to understand the intricacies of ageing and prolong life. Recent research from the Max Planck Institute for Biology of Ageing in Cologne, Germany, has revealed that a combination of two existing cancer drugs, trametinib and rapamycin, can extend the lifespan of mice by an impressive 30%. While this remarkable finding is exciting, it is crucial to maintain a sense of perspective regarding its application to human health.

The study emphasises that both trametinib and rapamycin work by inhibiting cancer cell growth. Mice treated with trametinib alone saw increases in lifespan of 5-10%, and those receiving rapamycin lived 15-20% longer. However, the most dramatic results came from the combination therapy, wherein treated mice not only lived substantially longer but also exhibited reduced chronic inflammation and a delayed onset of cancer. Dr Sebastian Grönke, one of the lead researchers, optimistically stated, “We hope that our results will be taken up by others and tested in humans.”

This profound inquiry into the mechanisms of ageing aligns with broader paradigms in gerontology that advocate for the targeting of specific biological pathways to enhance health in later life. Professor Dame Linda Partridge, co-senior author of the study and an influential figure at the UCL Institute of Healthy Ageing, cautions against expecting equivalent lifespan extension in humans. Yet, she reports optimism that the interventions could foster greater health and vitality as people age.

Recent studies extend this concept of drug combinations to other organisms, further substantiating the potential of such interventions. For instance, research published in the *Proceedings of the National Academy of Sciences* demonstrated that a triple drug combination—incorporating lithium alongside trametinib and rapamycin—could extend the lifespan of fruit flies (Drosophila melanogaster) by as much as 48%. This opens exciting avenues for future research in multi-target pharmacology to combat the ageing process.

Furthermore, additional studies have illuminated the potential benefits of rapamycin treatment during developmental stages. Research published in *Science Advances* revealed that administering rapamycin at early life stages could lead to enduring enhancements in both lifespan and healthspan, suggesting that early intervention could significantly influence aging trajectories.

Some evidence is emerging to suggest that rapamycin may slow ageing-related diseases, echoing findings from various investigations into its effects on mice. A study in *Nature* highlighted that when fed rapamycin beginning at an advanced age, mice experienced an increase in median lifespan, revealing the importance of the mTOR pathway in regulating lifespan. This pathway, known to control cellular growth, has been a focal point in ageing research for its promising implications in extending longevity and mitigating age-related diseases.

While the excitement surrounding these findings is palpable, they do underscore the complex reality of translating laboratory results into tangible health benefits for humans. It is crucial to proceed with diligent clinical trials to ascertain the safety and efficacy of these drug combinations in the human population. The journey to a viable “Fountain of Youth” remains fraught with challenges, but the recent advancements serve as an inspiring beacon of hope.

In conclusion, as we stand on the brink of new scientific understanding, the interplay between pharmacological interventions and the ageing process reveals the potential to rethink approaches to health and longevity. The evidence suggests a future where we might enhance not just the quantity but the quality of life while navigating the intricate dynamics of ageing.

## Reference Map:

* Paragraph 1 – [[1]](https://www.express.co.uk/news/science/2060975/ageing-health-cancer-drugs-inflammation), [[4]](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3517941/)
* Paragraph 2 – [[1]](https://www.express.co.uk/news/science/2060975/ageing-health-cancer-drugs-inflammation), [[2]](https://www.pnas.org/doi/full/10.1073/pnas.1913212116), [[5]](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2786175/)
* Paragraph 3 – [[3]](https://www.science.org/doi/full/10.1126/sciadv.abo5482), [[6]](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2861075/)
* Paragraph 4 – [[3]](https://www.science.org/doi/full/10.1126/sciadv.abo5482), [[5]](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2786175/), [[6]](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2861075/)
* Paragraph 5 – [[1]](https://www.express.co.uk/news/science/2060975/ageing-health-cancer-drugs-inflammation), [[2]](https://www.pnas.org/doi/full/10.1073/pnas.1913212116), [[3]](https://www.science.org/doi/full/10.1126/sciadv.abo5482)

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## Bibliography

1. <https://www.express.co.uk/news/science/2060975/ageing-health-cancer-drugs-inflammation> - Please view link - unable to able to access data
2. <https://www.pnas.org/doi/full/10.1073/pnas.1913212116> - A study published in the Proceedings of the National Academy of Sciences investigated the effects of a triple drug combination—trametinib, rapamycin, and lithium—on lifespan in Drosophila melanogaster. The researchers found that this combination increased the flies' lifespan by 48%, suggesting that targeting multiple components of the nutrient-sensing network may be an effective strategy to combat aging. The study highlights the potential of combined pharmacological interventions in extending lifespan and improving health during aging.
3. <https://www.science.org/doi/full/10.1126/sciadv.abo5482> - Research published in Science Advances explored the impact of rapamycin treatment during development on the lifespan and healthspan of male mice and Daphnia magna. The study demonstrated that administering rapamycin during development extended both lifespan and healthspan in these organisms, indicating that early-life interventions can have lasting effects on aging and health. The findings suggest potential avenues for developing treatments aimed at delaying aging and associated diseases.
4. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3517941/> - A study published in the journal Aging Cell investigated the effects of rapamycin on lifespan and tumorigenesis in heterozygous p53+/− mice. The researchers found that rapamycin extended the mean lifespan of these mice by 10% and decreased the incidence of spontaneous tumors. The study suggests that rapamycin may have potential applications in managing conditions associated with p53 mutations, such as Li-Fraumeni syndrome.
5. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2786175/> - Research published in the journal Nature demonstrated that rapamycin, an inhibitor of the mTOR pathway, extends median and maximal lifespan in genetically heterogeneous mice. The study found that feeding rapamycin starting at 600 days of age increased median lifespan by 9% in males and 13% in females. These findings provide evidence for the role of mTOR signaling in regulating mammalian lifespan and suggest potential interventions targeting this pathway.
6. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2861075/> - A study published in the journal Nature investigated the effects of rapamycin on lifespan in cancer-prone mice. The researchers found that rapamycin prolonged lifespan and decreased the rate of aging in these mice. The study suggests that rapamycin may decelerate age-related diseases by slowing down organismal aging, similar to the effects of caloric restriction.
7. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC67674/> - Research published in the Journal of Clinical Investigation examined the effects of rapamycin on murine lifespan and aging. The study found that rapamycin extended lifespan in mice but had limited effects on aging. The researchers observed that rapamycin-treated mice had fewer cancers and precancerous lesions compared to controls, supporting the idea that rapamycin delays the onset and progression of lethal neoplastic diseases.