Yi 200k Hackathon
biologyAI team

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AI for Life Extension

Many current exciting approaches for Life Extension

New drugs and treatments show great promise

Hard to know what are the latest treatments

How promising is the treatment?

Use AI to search recent literature

Tool for biohackers to use

AI tool for biohackers

People deeply into life extension

Search latest treatments in the scientific literature

Analyze these studies

Automate literature review

Scientific literature

Millions of papers relating to extending lifespan and quality

Thousands of new research papers every year

Written in a dense scientific style

How to keep up with the literature?

with AI assistance

Scientific papers are dense

BACKGROUND: Rapamycin, an inhibitor of the serine/threonine protein kinase mTOR, is an immunosuppressant used to treat renal transplant recipients, but it can cause endothelial and mitochondrial dysfunction. Metformin is used for the treatment of type 2 diabetes and was reported to exert therapeutic effects against rheumatoid arthritis and obesity by improving mitochondrial dysfunction via the activation of fibroblast growth factor 21. We investigated the therapeutic effects of rapamycin-metformin combination therapy in obese mice with collagen-induced arthritis (CIA). METHODS: Mouse embryonic fibroblasts were treated with rapamycin, metformin, or rapamycin-metformin, and their respiratory level and mitochondrial gene expression were assayed. Mice were fed a high-fat diet, immunized with type II collagen, and subsequently treated with rapamycin-metformin daily for 10 weeks. RESULTS: Rapamycin-treated cells exhibited dysfunction of mitochondrial respiration and decreased mitochondrial gene expression compared with rapamycin-metformin-treated cells. Moreover, rapamycin-metformin reduced the clinical arthritis score and the extent of histological inflammation and improved the metabolic profile in obese mice with CIA. Rapamycin-metformin enhanced the balance between T helper 17 and regulatory T cells in vitro and in vivo. CONCLUSIONS: These results suggest that rapamycin-metformin is a potential therapeutic option for autoimmune arthritis.

Simplify scientific papers for the layperson

Rapamycin + Metformin

The study suggests that certain drug combinations may not only treat specific diseases but also have broader implications for improving metabolic health and mitochondrial function, which are key factors in the aging process.

The findings highlight the potential of targeted drug therapies to address age-related diseases and improve overall healthspan.

Demo

For the demo we focused on two treatments

Rilmenidine and Metformin

Downloaded latest scientific abstracts using Entrez

Used Yi-34B-200k model to summarize the articles

"Summarize like you would for a layperson interested in life extension"

Technology

1) Use edirect cli tool to download abstracts

2) Yi LLM Evaluate efficacy

Rilmenidine

Rilmenidine for the can extend lifespan simply through its effects on cardiovascular and kidney health.

In a research worms treated with rilmenidine at either the early adult or late adult stage exhibited approximately 33% lifespan extension which is an eye opening result.

Composition

Molecular Formula:
$C_{10}H_{16}N_{2O}$
Molecular Weight: 180.25
Percent Composition:
C(66.63%), H(8.95%), N(15.54%), O(8.88%)

Mechanism of Action

Rilmenidine, an oxazoline compound with antihypertensive properties, acts on both medullary and peripheral vasomotor structures. Rilmenidine shows greater selectivity for imidazoline receptors than for cerebral alpha2-adrenergic receptors, distinguishing it from reference alpha2-agonists.

Rilmenidine - Scientific abstract

Repurposing drugs capable of extending lifespan and health span has a huge untapped potential in translational geroscience. Here, we searched for known compounds that elicit a similar gene expression signature to caloric restriction and identified rilmenidine, an I1-imidazoline receptor agonist and prescription medication for the treatment of hypertension. We then show that treating Caenorhabditis elegans with rilmenidine at young and older ages increases lifespan. We also demonstrate that the stress-resilience, health span, and lifespan benefits of rilmenidine treatment in C. elegans are mediated by the I1-imidazoline receptor nish-1, implicating this receptor as a potential longevity target. Consistent with the shared caloric-restriction-mimicking gene signature, supplementing rilmenidine to calorically restricted C. elegans, genetic reduction of TORC1 function, or rapamycin treatment did not further increase lifespan. The rilmenidine-induced longevity required the transcription factors FOXO/DAF-16 and NRF1,2,3/SKN-1. Furthermore, we find that autophagy, but not AMPK signaling, was needed for rilmenidine-induced longevity. Moreover, transcriptional changes similar to caloric restriction were observed in liver and kidney tissues in mice treated with rilmenidine. Together, these results reveal a geroprotective and potential caloric restriction mimetic effect by rilmenidine that warrant fresh lines of inquiry into this compound.

Rilmenidine - Yi 34B 200k summary

What is Rilmenidine? A drug typically used to treat high blood pressure.

New Discovery: Rilmenidine may help you live longer and healthier, just like if you were on a calorie-restricted diet!

How it Works: By activating a protein called the I1-imidazoline receptor, rilmenidine changes how your genes work, similar to how calorie restriction does.

Benefits: Extends the life of worms in lab tests and makes them better at handling stress.

Clinical Trials: More research is needed to see if rilmenidine has the same effects in humans and if it's safe to use for life extension.

Metformin

Metformin is a widely used oral medication for managing blood sugar levels in type 2 diabetes, and it has gained interest in the field of life extension due to its potential anti-aging properties. Research suggests that metformin may influence longevity by improving insulin sensitivity.

Composition

Metformin, chemically known as N,N-dimethylbiguanide, is a biguanide molecule comprising two linked guanidine rings responsible for its anti-hyperglycemic effects.

Mechanism of Action

It functions by reducing hepatic glucose production, decreasing intestinal absorption of glucose, and enhancing insulin sensitivity through increased peripheral glucose uptake and utilization.

Metformin - Scientific abstract

The numerous beneficial health outcomes associated with the use of metformin to treat patients with type 2 diabetes (T2DM), together with data from pre-clinical studies in animals including the nematode, C. elegans, and mice have prompted investigations into whether metformin has therapeutic utility as an anti-aging drug that may also extend lifespan. Indeed, clinical trials, including the MILES (Metformin In Longevity Study) and TAME (Targeting Aging with Metformin), have been designed to assess the potential benefits of metformin as an anti-aging drug. Preliminary analysis of results from MILES indicate that metformin may induce anti-aging transcriptional changes; however it remains controversial as to whether metformin is protective in those subjects free of disease. Furthermore, despite clinical use for over 60 years as an anti-diabetic drug, the cellular mechanisms by which metformin exerts either its actions remain unclear. In this review, we have critically evaluated the literature that has investigated the effects of metformin on aging, healthspan and lifespan in humans as well as other species. In preparing this review, particular attention has been placed on the strength and reproducibility of data and quality of the study protocols with respect to the pharmacokinetic and pharmacodynamic properties of metformin. We conclude that despite data in support of anti-aging benefits, the evidence that metformin increases lifespan remains controversial. However, via its ability to reduce early mortality associated with various diseases, including diabetes, cardiovascular disease, cognitive decline and cancer, metformin can improve healthspan thereby extending the period of life spent in good health. Based on the available evidence we conclude that the beneficial effects of metformin on aging and healthspan are primarily indirect via its effects on cellular metabolism and result from its anti-hyperglycemic action, enhancing insulin sensitivity, reduction of oxidative stress and protective effects on the endothelium and vascular function.

Metformin - Yi 34B 200k summary

Metformin is a T2DM drug with potential anti-aging effects.

Research suggests it may extend lifespan and improve healthspan.

Mechanisms of action include improved metabolism and reduced oxidative stress.

Preliminary trials show metformin may alter aging-related gene activity.

Overview of Life Extension Drugs Market

Target Market: High net worth individuals, health-conscious middle-income groups, and healthcare sectors.

Current Trends: Increasing demand for anti-aging products, health services, and life-extending technologies.

Estimated TAM for Premium longevity therapies: $250 billion by 2030, considering market trends and potential consumer base.